Medical Library

SERIES 3, Vol. 23, No. 3 MARCH, 1940

MAR 20 1940

AMERICAN JOURNAL OF OPHTHALMOLOGY

CONTENTS

		PAGE
Studies in hydrocephalus, special reference to papilledema	*J. Q. Griffith, Jr., W. E. Fry, and A. McGuinness*	245
Lens lesions in contusions. A medico-legal study	*M. Davidson*	252
Use of sulfanilamide in trachoma	*W. D. Spining*	271
Pathogenesis of retinitis pigmentosa, I.	*L. Levy-Wolff*	275
Hemangioma of the orbit	*A. E. Meisenbach, Jr.*	286
Is myopia a deficiency disease?	*H. Miller*	296
Trachoma in Japan, special reference to public health	*H. Shiga*	306
Deafness and retinitis pigmentosa	*G. Hardy*	315
A new ultraviolet lamp	*E. B. Hague*	317
Foreign body in both orbits	*C. T. Eber*	318
Kinetic test for binocular stereopsis	*F. H. Verhoeff*	320
Aid to indirect ophthalmoscopy of peripheral fundus	*H. S. Gradle*	321

DEPARTMENTS

Society Proceedings	322
Editorials	333
Book Notices	337
Abstracts	341
News Items	369

For complete table of contents see advertising page V

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Subscription price in United States ten dollars yearly. In Canada and foreign countries twelve dollars. Published monthly by the George Banta Publishing Company, 450 Ahnaip Street, Menasha, Wisconsin, for the Ophthalmic Publishing Company. Subscription and Editorial Office: 640 S. Kingshighway, Saint Louis, Missouri. Entered as second class matter at the post office at Menasha, Wisconsin.

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AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 23 MARCH, 1940 NUMBER 3

EXPERIMENTAL AND CLINICAL STUDIES IN HYDROCEPHALUS*

WITH ESPECIAL REFERENCE TO THE OCCURRENCE OF PAPILLEDEMA

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Hydrocephalus in children is sometimes associated with papilledema, but usually is not. The reason for this variation has not been clear. In previous studies Griffith, Jeffers, Fewell, and Fry,[1] and Jeffers, Griffith, Fry, and Fewell[2] have suggested that the occurrence of papilledema requires the presence of a patent perineural optic space. The evidence upon which this suggestion was based was as follows: Rats injected intracisternally with colloidal kaolin will develop in 5 to 7 days increased intracranial pressure as measured directly by a needle in the cistern. This intracranial hypertension tends to persist over a period of weeks without the appearance of papilledema. Such an animal we will designate as the kaolin-hypertensive rat. Whereas thorotrast injected intracisternally in the normal rat enters the perineural space of the optic nerve, and outlines the nerve by X-ray, in the kaolin-hypertensive rat this does not occur. The kaolin has blocked the perineural space. If a growing sarcoma is implanted into the cerebellum of a normal rat, papilledema will occur. However, if the tumor is implanted into a kaolin-hypertensive rat, papilledema will not occur. From this evidence it was concluded that papilledema will not occur in the presence of a blocked perineural optic space, even when the other conditions which produce papilledema are present. The failure of thorotrast to enter the perineural optic space was regarded as evidence of such block.

All the normal rats implanted with tumor and many of the kaolin series without tumor had some degree of hydrocephalus. The hydrocephalus in the normal series with tumor was obviously obstructive, due to the block by the tumor. However, the hydrocephalus in the kaolin series without tumor was of the communicating type, shown by the fact that thorotrast, injected into the cisterna magna, entered both the ventricles and subarachnoid space. It is obvious, therefore, that in the series studied, the obstructive hydrocephalus was associated with papilledema, and the communicating type was not. In the earlier papers this relationship was not emphasized.

In a later study of subarachnoid hemorrhage, Griffith, Jeffers, and Fry[3] showed that a previous subarachnoid hemorrhage may block the perineural optic space in rats. They also showed in a clinical series that papilledema is an extremely rare complication of subarachnoid hemorrhage.

In the present report certain studies on rats are carried further, and the clinical findings of cases of hydrocephalus reviewed. The clinical cases were obtained from the Children's Ward of the University Hospital, and the Children's Hospital.

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Experimental studies

Method: White rats were used throughout (see table 1).

Series 1. In four normal rats, under nembutal anesthesia, the chest was opened and the rats were permitted to die. Immediately 1 c.c. of thorotrast was injected into the common carotid artery on one side, the animal decapitated, and the head placed in formalin. After 24 hours the skull was cleaned of skin and muscle and the lower jaw removed. The skull was decalcified for several days in 5-percent HNO_3, the acid being changed daily. Roentgenograms were then taken.

Series 2. Under ether anesthesia 21 normal rats were injected intracisternally with approximately 0.04 c.c. thorotrast, after the preliminary withdrawal of an equal amount of cerebrospinal fluid. The animals were permitted to recover, but 1 to 3 hours later were again etherized, decapitated, and the head treated as described for series 1.

TABLE 1

Visualization of vein of Galen under experimental conditions

Series		Vein of Galen Shown	Not Shown
2	Normal rats, thorotrast injected into the cistern	13	8
3	Normal rats, thorotrast injected into or near ventricles	7	2
5	Rats one week after subarachnoid hemorrhage, thorotrast injected into cistern	7	14
6	Kaolin-hypertensive rats, thorotrast injected into cistern	6	8
	Same but definitely hydrocephalic	0	3

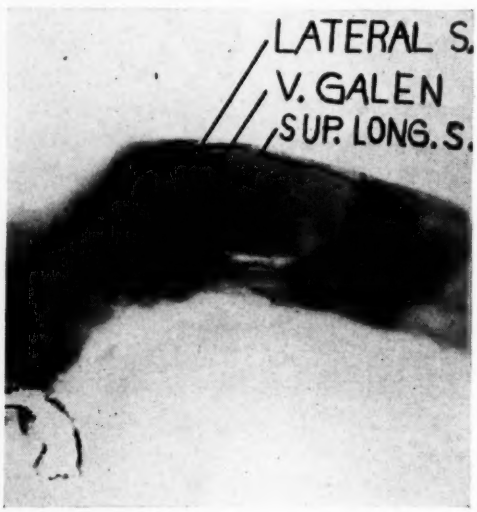

Fig. 1 (Griffith, Fry, and McGuinness). Roentgenogram showing in lateral view the decalcified skull of a rat into the carotid artery of which 1 c.c. of thorotrast had been injected immediately after death. The superior longitudinal and lateral sinuses and vein of Galen are shown.

Series 3. Under ether anesthesia, thorotrast was injected into one of the lateral ventricles in nine normal rats. When the injection was not primarily intraventricular it was thought to rupture into the ventricle secondarily. About 0.05 c.c. was injected. In 2 to 3 hours the animals were killed and the heads treated as described for series 1.

Series 4. By the technique described for series 3, four normal rats were injected intraventricularly with hydrocollag 300, prepared according to the method of Drinker.[4] After 24 hours in formalin the brains were removed and sectioned histologically.

Series 5. Twenty-one normal rats were given 1 to 3 subarachnoid hemorrhages by thrusting a needle through one of the cranial sinuses, by a technique previously described.[5] When more than one hemorrhage was induced, the hemorrhages were a week apart. One week after the last hemorrhage, the animals were injected with thorotrast intracisternally and the

procedure followed as outlined for series 2.

Series 6. Seventeen animals previously injected intracisternally with kaolin were later injected with thorotrast and the procedure followed as for series 2. The success of a kaolin injection may be gauged by the appearance of a vascular hypertension secondary to the increased intracranial pressure.[6] This criterion was used in all 17 of these animals.

Experimental results

The roentgenogram of a rat after its carotid had been injected with thorotrast is shown in figure 1. The angiogram is primarily a phlebogram, showing in anteroposterior view the superior longitudinal and lateral sinuses. In the lateral view the veins of Galen passing to the torcular Herophili can be seen. In the rat the inferior longitudinal sinus is small and lies very close to the superior longitudinal sinus, due to the narrowness of the falx cerebri. The former is seen with difficulty in the roentgenogram, and the point of its junction with the vein of Galen and the beginning of the straight sinus cannot be definitely located.

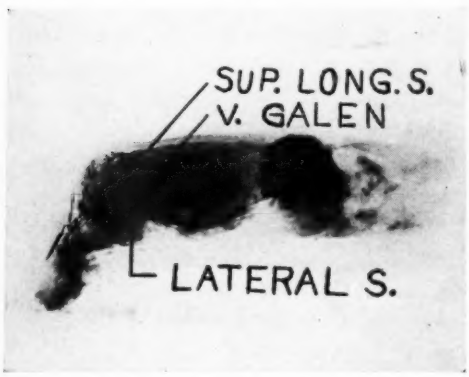

Fig. 2 (Griffith, Fry, and McGuinness). Roentgenogram showing in lateral view, the decalcified skull of a rat into the cisterna magna of which 0.04 c.c. of thorotrast had been injected one hour before death. The same sinuses and veins show as in figure 1 but less distinctly.

In figure 2, the roentgenogram of an animal of series 2, in which the thorotrast was given intracisternally, the same sinuses are also outlined, including the vein of Galen. The visualization of the vein of Galen was noted with special interest and the significance will be discussed below. Its appearance or nonappearance in animals of series 2, 3, 5, and 6 is charted in table 1. Histologic sections made of animals injected intraventricularly with hydrocollag 300 (series 4) showed carbon along the perivascular space of the vein of Galen extending away from the site of injection (fig. 3).

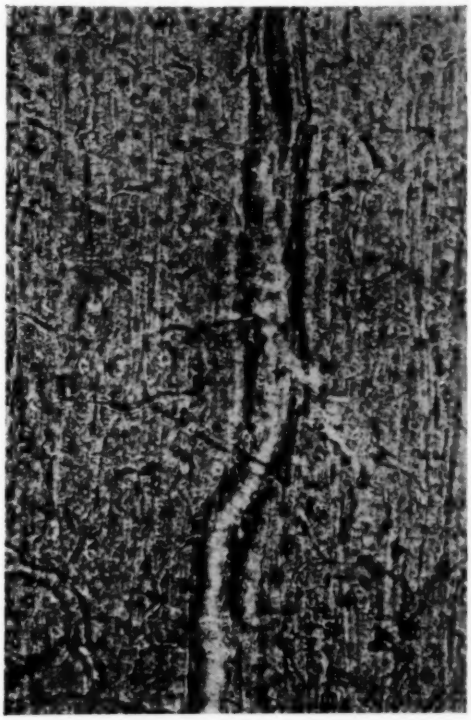

Fig. 3 (Griffith, Fry, and McGuinness). Photomicrograph of a branch of the vein of Galen 24 hours after the intraventricular injection of hydrocollag. Carbon appears in the perivascular space. × 280.

Discussion of experimental results

The finding of particulate matter previously injected into the cistern in the

walls of the sinuses, especially the superior longitudinal sinus, is an old story. Most observers have assumed that in the passage of fluid into the sinus, perhaps through Pacchionian bodies, the particles were strained out.

The explanation would account for the visualization of the superior longitudinal and lateral sinuses in certain animals of series 2 to 6; that is, enough thorotrast had been filtered out by the walls of the sinuses to make them X-ray opaque. However, this explanation cannot account for those cases in which the vein of Galen is visible. This vein drains the tissue about the ventricles, perhaps also the ventricles. It is not in contact with the cerebrospinal spaces. Its visualization must mean the presence of a current in its perivascular space carrying thorotrast along, probably eventually to the cervical lymph nodes. While the vein of Galen is not always shown, it is usually visualized in normal animals in which thorotrast has reached the ventricles.

Clinical findings

In the hospital records accessible to us 12 children with hydrocephalus have been studied during the past 10 years completely enough to include (1) an eye examination by an ophthalmologist, and (2) data to justify a classification of the type of hydrocephalus, whether communicating or noncommunicating. Using the same criteria we have collected 37 cases from the literature.[7-25]

In our series, the presence or absence of communication between the ventricles and subarachnoid space is based upon the results of dye injection in 5 cases, of encephalograms in 6 cases, and of autopsy findings in 3 cases. Of the cases from the literature the classification depends upon dye injection in 9 cases, ventriculography in 2 cases, operation in 1 case, and autopsy in 29 cases. Thus in certain cases two types of evidence were present. The results are shown in table 2. It will be seen that 45 of the 49 cases conform to the suggestion that papilledema is associated with noncommunicating hydrocephalus, and is absent with communicating hydrocephalus. There are four exceptions. One of these occurred in our series. The diagnosis of noncommunicating hydrocephalus depended in that case upon the failure of phenolsulphonphthalein injected into the ventricle to be recovered on spinal tap 15 minutes later. Of the one case of communicating hydrocephalus with papilledema in the literature it should be stated that the dye passed from the ventricle to the cistern in extremely small amounts, so that the author concluded there was a partial obstruction. Of the two cases of noncommunicating hydrocephalus without papilledema, one had a block of only one foramen of Monroe. A similar case had only intermittent papilledema.

TABLE 2

SHOWING OCCURRENCE OF PAPILLEDEMA IN PATIENTS WITH COMMUNICATING AND NONCOMMUNICATING HYDROCEPHALUS

	Our Series	Literature	Total
Communicating and no papilledema	9	7	16
Noncommunicating and papilledema	2	27	29
Communicating and papilledema	0	1*	1
Noncommunicating and no papilledema	1	2**	3

* Dye passed from ventricle to cistern in very small amounts.
** In one of these the obstruction was in the foramen of Monroe.

Discussion

It appears that the association of papilledema with the noncommunicating type of hydrocephalus indicated by the experimental work is supported by the clinical material.

Papilledema may be considered to result from increased absorption and transmission of cerebrospinal fluid along the perineural optic space. This should occur in any condition causing increased cerebrospinal-fluid pressure, provided the perineural optic space is patent.

It is generally agreed that cerebrospinal fluid is formed by the choroid plexus, with some additions from the perivascular spaces of the central nervous system. Therefore, most of the newly formed cerebrospinal fluid appears in the ventricles, from which it passes through the foramina of the fourth ventricle to the subarachnoid space. From the subarachnoid space it is absorbed into the blood stream, at least partly through the Pacchionian bodies of the venous sinuses. A smaller and presumably unimportant fraction is absorbed into the perineural spaces of the cranial and spinal nerves and passes along these spaces to reach the lymphatic system. A few authors have believed that this lymphatic absorption is important, for example, de Lange[26] believes that it may account for 20-percent of the total absorption. Hydrocephalus is thought to occur when for any reason a block occurs in the transmission of cerebrospinal fluid from its point of formation to its places of absorption. Thus, when the block occurs between the ventricles and the subarachnoid space, internal noncommunicating hydrocephalus results. When the block occurs at the point of absorption, presumably into the blood stream, communicating hydrocephalus results. Phenolsulphonphthalein, when injected into the cerebrospinal space of such patients, is excreted in the urine at a delayed rate. This is thought to prove diminished blood-stream absorption.

We accept the mechanism of cerebrospinal-fluid formation and the manner in which block occurs in noncommunicating hydrocephalus. However, in communicating hydrocephalus a somewhat different explanation is possible. We believe that perivascular as well as perineural absorption occurs in the normal animal. Such perivascular absorption is one of the normal routes by which fluid leaves the ventricle. The evidence suggests that both perineural and perivascular channels are obstructed in case of communicating hydrocephalus. Such block, involving the normal drainage routes from the ventricle, would explain why communicating hydocephalus is also internal hydrocephalus. Whether there is a simultaneous interference with blood-stream absorption is unproved. Griffith and Roberts[6] have shown that there is no demonstrable interference with absorption into the blood stream in the kaolin-hypertensive rat. In man, the delayed excretion of phenolsulphonphthalein in the urine after the drug has been injected into the cerebrospinal space, in cases of communicating hydrocephalus, has been interpreted as indicating diminished blood-stream absorption. This may be so, but an alternative explanation is possible. Phenolsulphonphthalein is probably absorbed in proportion as cerebrospinal fluid is absorbed, and this, under conditions of constant pressure, is absorbed at essentially the same rate as it is formed. In cases of long standing, hydrocephalus formation might be decreased, for example, by atrophy of the choroid plexus. In fact, this has been suggested as the cause of the occasional recovery observed clinically. Therefore, diminished rate of excretion of phenolsulphonphthalein by the kidney should not be assumed to mean deficient absorption into the blood stream unless the rate

of cerebrospinal-fluid formation has been shown to be normal.

In discussing animal experimentation the type of animal should be considered, as there are marked specie differences. For example, after an intracisternal injection of kaolin, internal hydrocephalus develops in the dog, cat, and rat. This hydrocephalus is communicating in type in the cat and rat but is noncommunicating in the dog, because of dense adhesions about the roof of the fourth ventricle. Moreover, there is associated vascular hypertension in the dog and rat, but not in the cat.

There is evidence in the literature of perivascular or perineural absorption from an obstructed ventricle. Hoen[27] has shown that water, and to a lesser extent physiologic saline, can be absorbed in considerable amount from the ventricle of the dog when the aqueduct is plugged. Wislocki and Putnam,[28] using cats, injected particulate matter into the ventricle, egress from which they assumed, but did not prove, had been blocked by a previous injection of carbon. They found the particulate matter in the intercellular, perineuronal, and perivascular spaces. Dandy and Blackfan[22] described the occurrence of communicating hydrocephalus after the ligation of the vein of Galen in 1 out of 10 dogs. Bedford[29] was unable to confirm this in a much larger series, and argued that one of the two clinical cases reported by Dandy was really a perisinusitis of the straight and longitudinal sinus. A perisinusitis is, however, precisely the condition produced, we believe, by kaolin which presumably reaches the same location as the hydrocollag shown in figure 3.

Evidence of obstruction of the perineural spaces was obtained by Hassin[21] in the brain obtained at autopsy from a patient with communicating hydrocephalus, in which he observed infiltration and dilatation or obstruction of certain of the perineural spaces.

Hydrocephalus in infants may occur following the surgical repair of a meningocoele with associated spina bifida. Such patients usually do not have papilledema. Russell and Donald[30] have shown, however, that there is, as a rule, a deformity of the pons and medulla called the Arnold Chiari malformation. Then ventricular fluid is discharged into the subarachnoid space of the cord, which by a valvelike formation is shut off from the cerebral subarachnoid space. Absorption is thus relatively inadequate and hydrocephalus results. However, as the cerebral subarachnoid space is shut off from the spinal space this former does not share in the accumulation of cerebrospinal fluid, hence papilledema would not be expected.

Summary

When thorotrast is injected into the cisterna magna of the rat it spreads about the subarachnoid space and usually enters the ventricles. From the subarachnoid space it extends along the perineural pathways, especially those of the optic nerves, outlining them as seen in the roentgenograms. From the ventricle it is absorbed along the perivascular spaces of the vein of Galen and its tributaries, probably eventually reaching the spaces about the straight sinus, the lateral sinus, the internal jugular vein, and draining to the cervical lymph nodes. Thorotrast outlines the perivascular space of the vein of Galen more regularly after injection into the ventricle than after intracisternal injection. Hydrocollag injected into the ventricle may be identified histologically in the perivascular space of the vein of Galen.

An intracisternal injection of kaolin tends to block the perineural optic space and, less regularly, the perivascular space of the vein of Galen. Thus a subsequent

injection of thorotrast does not regularly outline these spaces. Blood from a subarachnoid hemorrhage has the same effect as kaolin, but acts less efficiently. Papilledema results if there is increased flow of fluid, or transmission of increased pressure, along a patent perineural optic space. This occurs in obstruction of the aqueduct; therefore, papilledema is associated with noncommunicating hydrocephalus. Communicating hydrocephalus is associated with, and is possibly caused by, block of both perineural absorption and of perivascular absorption from the ventricle. Therefore papilledema does not usually occur in communicating hydrocephalus. Analysis of clinical material showed that 45 out of 49 cases conformed to these conclusions drawn from the experimental data.

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LENS LESIONS IN CONTUSIONS

A MEDICO-LEGAL STUDY

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Lens lesions from contusions give rise to frequent controversies in the administration of workmen's compensation. A survey of the problem as it presents itself in actual practice is here attempted in the form of a brief review of the literature, and of an analysis of the material dealt with in the past 1½ years at the Bureau of Workmen's Compensation of the New York State Department of Labor.

Fuchs[1] classifies cataracts into the partial stationary ones and the progressive ones, and refers to contusion lesions only as follows:

> Cataracta corticalis anterior and posterior are sometimes observed after injury of the lens, both when the lens capsule is opened and also in simple contusion of the lens without rupture of the capsule. The stellate opacity in the cortex develops in the days immediately succeeding the injury and may either rapidly pass over into complete opacity of the lens, or remain stationary, or may even disappear.

While lens opacity and cataract are generally used as synonyms, for statistical and medico-legal purposes, and particularly for the peace of mind of a patient or a claimant for compensation, the use of the term "cataract" to describe all kinds of lens opacities, regardless of their effect on visual acuity or fundus visibility or probable evolution, is confusing and highly undesirable. The writer uses the term "cataract" in this paper to describe a lens opacity only when it is so complete as not to permit an examination of the fundus. Otherwise the term "lens opacity" is used. The term "lesion" of course describes both kinds. In citations, the term "cataract" is left as in the original, although often it means merely lens opacity.

This study deals only with the permanent lesions of the lens due to contusion. Cases of direct wounding of the lens from eye perforations or ruptures, in which the lens may be directly injured, and in which a brief or prolonged hypotony may play a role in the picture presented, and resulting in what is classically described as a "traumatic cataract," are reserved for a separate study.

The prebiomicroscopic literature concerning the subject is quite voluminous, and, for the sake of proper historical perspective, a brief reference to its highlights is desirable.

The earliest paper on the subject is apparently that of an American author, Ezra Dyer.[2] In his paper on "Fracture of the lens of one eye and of the anterior capsule of both from death by violent hanging," he describes the lens findings in a man after hanging and in three dogs hanged as an experiment, as horizontal "fractures . . . like clear cracks in ice . . . with radiations and feathery iridescence of capsule case . . . the greater lesions being on the side of the fall," and wonders whether "it is connected with sudden concussion and shock to the nervous system." These "fractures" we would today call undoubtedly suture separations and water-clefts.

According to Wagenmann,[3] "experimental work indicates that contusion cataract arises probably without a capsule tear, although an invisible equatorial or posterior capsule tear is possible, and due either to epithelial lesions or to displacements of the lens mass in its capsule. It may evolve in hours or days, remains mostly circumscribed and stationary, but

may become total or may retrogress." While Wagenmann has no general doubts about the reality of contusion and even concussion cataract—namely, from head and body concussion—he does have some misgivings about some of the cases reported in the literature which he reviewed, and says (p. 495):

> If the patient appears some time after trauma, one must think of a secondary cataract from other contusion sequelae such as detachment. Decision is difficult in many cases.

Biomicroscopic contributions to the subject of lens lesions from contusion

If we bear in mind the inadequacy of our knowledge of lens pathology in general in the preslitlamp days, that Wagenmann who reviewed completely the world literature up to the time of the World War had collected reports of contusion cataracts amounting only to a couple of hundred cases, that there were great uncertainty as to its mechanism and generally admitted difficulties in its diagnosis, the desirability of a review of the subject in the light of the slitlamp contributions is apparent.

A great deal of our knowledge of lens morphogenesis, architecture, and pathology has had to be revised since the introduction of the slitlamp some 17 years ago. Jess[4] believes that postmortem changes and fixation artifacts have so far been insuperable obstacles in the way of our knowledge of the histopathology of lens lesions.

In the presence of nature's method of tissue fixation and differential staining represented by a lens opacity, and by utilizing the narrow slit as a microtome, biomicroscopy has vastly furthered our knowledge of the lens.

Vogt's[5] epoch-making and fundamental labors in the field have led to a general recognition of the specific ages of the several lens zones, of the specific morphology of each lens zone in its reaction to injury in general, and of a specific morphology of the results of mechanical injury and of "remotio cataractae traumaticae."

Traumatic "cataracts" are considered by Vogt as varieties of the complicated cataract and a special chapter is devoted to them, "because of the special morphologic picture which distinguishes them quite sharply from all other exogenous lens injuries." In dealing with "cataracts" in contusions, Vogt was, however, mainly concerned with establishing the facts of "remotio" cataractae traumaticae, the burying of the originally subcapsular opacity in the cortex by the superposition of new lens substance, and the juvenile contusion origin of the deep anterior cortical late rosette opacity, which he finds to be mainly partial and asymmetrical and believes to be due to the oblique application of force. In addition he deals at length with the Vossius ring, the latter said to occur only in the young. Except for pointing out that in the adult the remotio is much slower and rarely passes the anterior disjunction band, and rosettes are rarer, due to nuclear sclerosis, Vogt, on the whole, does not elaborate on contusion lens opacities.

Aside from the several reservations in regard to the special morphology of traumatic lens lesions, water-clefts being admitted to occur in them as well as in the senile and complicated, and a porous tufted structure being observed in the old traumatic cataracts posteriorly just as in the strictly speaking complicated cataract, Vogt places next to an illustration of a traumatic cataract, one very similar, not however, due to injury but to an iridocyclitis, in order to point out the difficulties in the differential diagnosis (see his figures 1258 and 1259).

He (p. 619) records observation of a continuation of the anterior rosette along a corresponding posterior discontinuity

zone and of cases of traumatic zonular cataract. In addition Vogt also reports presenile coronary lens opacities and cerulean opacities, and hook-shaped riders and senile lens opacities being provoked or activated by eye contusions.

The work of Vogt in regard to the juvenile contusion origin of the deep anterior-cortical late rosette-shaped opacities has been confirmed practically by all writers on the subject. Lugli,[6] who brought the subject up to date, described a case in which he observed the formation of an anterior rosette without a capsule rupture. He believes a capsule rupture does not intervene in their formation. The frequently observed additional opacities lying anteriorly to the discontinuity zone of the principal rosette, believed by Vogt to be either simultaneous in origin or to be split off later, and the posterior cortex opacities represent, according to Lugli, secondary, later lens changes resulting from the contusion. Lugli states that he has never observed the feathery or tufted posterior rosette. Incidentally, the latter, which should be called star-shaped because of its pointed rays, often figures in atlases, while the rosettes are rarely illustrated.

Lamellar or zonular opacities are generally described as congenital or as acquired in early youth, as bilateral, uniformly developed in each eye, and as stationary. Unilateral zonular opacities are, however, not infrequently observed, and are attributed to iritis, keratitis, and to trauma.

Law[7] finds that the factor most probably responsible for uniocular zonular "cataract" is a nonperforating injury, and reports 16 cases collected from the literature and 6 cases of his own. In addition he finds the recession curve of subcapsular opacities to become a plateau after about 10 years, with recession at first quite rapid but becoming rather slow after the second year.

Koby,[8] who follows Vogt very closely in general, also points out the difficulty of distinguishing old traumatic cataract from complicated cataract, for which it may be mistaken.

Duverger and Velter[9] suggest the use of the term "opacity" for the partial and stationary lens lesions, and limiting the term "cataract" to the progressive ones only. They divide complicated cataracts into "pathologic," or those due to systemic disease, and "choroidal," or those due to local intraocular disease, and call attention to the difficulty of differentiating traumatic cataracts in their later stages from the choroidal ones.

Alajmo[10] states that it requires several days to weeks for the development of a contusion cataract; that it may begin in the posterior subcapsule and cortex; that an anterior opacity may recede very rapidly or not recede at all, depending on whether a localized lens atrophy sets in or not; that lens subluxation inhibits opacification. He finds capsule laceration and folds rare.

Disler[11] observed annular posterior-capsule opacification, analogous to the anterior Vossius ring, in five cases after contusions; both anterior and posterior rosettes following contusions within one week in adults; and, following a contusion, an anterior rosette alone only once in a boy of nine years. He finds that the rosettes are composed of vacuoles in their early stages, becoming granular with rounding-off of the sharp points of their rays in their later stages; that both in contusions and in lens perforations there is no continuity between the star-shaped and the rosette formations and the perforation or equatorial vacuolization noted at the same time, and believes equatorial vacuole formation a *sine qua non* for total lens opacification; and that presence of a star-shaped or a rosette formation signifies a ruptured capsule. He records a continuous observation of a case of con-

tusion leading to total opacification in nine months and reports observation of several cases of zonular, cerulean, and rider formations following contusions.

Cattaneo[12] in a combined clinical and experimental attack on the subject reports in 39 cases of contusion lens lesions, 12 with capsule rupture, 14 with capsule changes but no true solution of continuity, and 13 without any demonstrable capsule changes. He describes and illustrates in detail 30 of them. Noteworthy are the following observations: A capsular opacity and its recession to the level of the adult nucleus with a cuneiform opacity opposite it but connected by a bridge of radially disposed fine linear opacities, resulting from a contusion at the age of 8 years and observed at the age of 20; a case of Vossius ring observed in a person of 53 years, with activation of cuneiform opacities by the contusion; another case of activation of senile opacities by a contusion in a person of 67; a case of "remotio" to adult nucleus level after a year in a person of 29, and a case of remotio to adult nucleus level after two years in a person of 38 years.

The experimental findings, both biomicroscopic and histologic, from the application of methods of contusion analogous to those occurring in man, are described and illustrated, as follows:

(1) Immediate reversible and transient lesions in the form of punctate opacification of anterior suture lines and sometimes of the posterior suture lines. (2) Irreversible secondary opacities, disc-shaped, in the anterior cortex, sectorlike cuneiform opacities, regularly shaped and irregular various-size dots and plaques, sometimes accompanied by posterior cortical opacities in corresponding sectors. He observed no capsule ruptures nor total lens opacifications, and in only one experiment was there involvement of the whole anterior and posterior subcapsular lens layers. He noted no special morphologic patterns and attributes it to the different architecture of the suture systems in the animals from that of man.

Reviewing the combined clinical and experimental observations, Cattaneo arrives at the following conclusions: The mechanical factors in the production of a lens lesion are corneal and scleral indentations, displacements of the aqueous, changes of position and of curvature of the lens. The pathogenetic factors are reversible capsule changes, but not necessarily solutions of continuity with separation of capsule from lens both anteriorly and posteriorly, so that one can speak of a subluxation of lens in its capsule, and penetration of aqueous; and irreversible changes in the form of stationary or progressive opacities due to biochemical later changes in which preexisting metabolic pathologic processes may play a rôle. In conclusion, Cattaneo stresses the subcapsular origin of all contusion lesions, the clue as to age from the depth of an opacity, and the specific morphology of contusion lesions as an aid in medico-legal diagnosis.

Biomicroscopy is still young, and new observations are being added to complete our knowledge almost daily. Weill[13] reports a case of a severe eye contusion, after the absorption of hyphemia on the fourth day, in which he noted "something never before seen by him nor found recorded anywhere, not even in Vogt's Atlas"; namely, an apparently annular, posterior, somewhat oval capsule formation believed to be a rupture, which later became a subcapsular saucer-shaped opacity, sharply outlined and slightly iridescent, and which he believed to represent a condition analogous to the Vossius ring in its genesis.

The contribution of biomicroscopy to the subject of contusion lens lesions may be said to rest on our ability not only to section the lens and determine the depth of a lesion, but to analyze superimposed

lesions and to penetrate across anterior lesions to the posterior capsule to an extent not possible before. The importance of the use of the narrow beam and of retroillumination cannot be too much stressed. It has served to rectify some previously held notions. It shows a much greater rarity of posterior-capsule ruptures, an intactness of the equatorial capsule when accessible to examination in colobomata, and draws our attention to the biochemical factor alongside the mechanical factor of microscopic solution of continuity, in the production of a contusion lens opacity. It has also established the difference between contusions in the young and in the adult in their effect on the lens. It has demonstrated that an opacity has the tendency to traverse the equator backwards along the same discontinuity surface or zone, and that zonular, coronary opacities and riders and other cortical opacities can be observed in contusions.

Clapp[14] believes not only contusion but concussion cataracts are possibly due to equatorial capsule ruptures; he considers sharpness of outline to be characteristic of the old lens opacity, without defining, however, the term "old" in months or years.

From the standpoint of the pathologist, Samuels,[15] who believes a new study of lens pathology overdue, defines complicated cataract as one due to lesions within the eyeball. He ascribes it to interference with lens metabolism, said to be governed chiefly by the aqueous and secondarily only by gross changes in the stroma of the vitreous, and mainly due to inflammation of the anterior segment.

Ellett[16] in discussing Clapp's paper said: "When the cataract develops some months or more after a contusion of the head, it is difficult to be so sure. It is a rule of law that one is considered innocent until proved guilty, and the rule might well be applied in such a case. In general, one would be inclined to doubt the connection."

The diagnosis of lens lesions due to contusion

In meeting the diagnostic problems in workmen's compensation, the state ophthalmologist has the advantages of possessing the records of the claimant's previous ocular injuries, of the benefit of subpoenaing the records of examinations made for other purposes, the control of the claimant for repeated examinations during many years to note evolution of an opacity, and an unusually large material of contusion lens lesions to observe and study.

To clarify some of the diagnostic problems and to supplement their inadequate presentation in general textbooks, there is herewith attempted an analysis of a "run-of-the-mill" group of permanent lens lesions observed in eye contusions of 55 persons in the course of 1938 and the first half of 1939, with involvement of both eyes in two of them, making a total of 57 eyes.

Since the diagnostic criteria sought are intimately bound up with the age of the individual, the cases are tabulated in the order of the ages of the individuals at time of last observation and in the suborder of length of observation since the contusion occurred, when available. Most of the cases have been examined more than once, some as many as six times, and are subject to future examinations. The "Nature of injury" column contains the attending ophthalmologists' data and the "End result" column the results of the writer's examinations. In the descriptions, the terms "equatorial" and "axial" are used in preference to "peripheral" and "central," often improperly used instead, but having legitimate uses of their own. The illustrations are based on care-

ful sketches made at the time of each examination, but lay no claim to either photographic fidelity or artistic execution.

Since the diagnosis of an eye contusion was not involved in these cases primarily, the major concern being with an intensive study of the lens and not of the incidence of iris lesions, vitreous pigment, and fundus lesions, the latter are not tabulated separately.

Included are cases of early acquired lens lesions, either admitted to have been acquired in early youth or obviously not the result of an irrelevant recent injury or found in an eye not in question; a few

TABLE 1

EARLY ACQUIRED CONTUSION LENS OPACITIES

Number Name Age	Eye and Vision	History or Evidence of Eye Contusion	Lens Findings
1 G.B.	O.D. 20/20	Pupil round. Lower temporal faint limbus scar	Perinuclear zonular punctate and linear opacification denser in center
2 A.M. 22	O.S. 20/33	Faint lower nasal pupillary deformation. History of eye contusion at age of 10. Lower nasal deep linear corneal scar. Large floating vitreous opacity. Lower temporal juxtapapillary pigmented scar	Deep anterior lower nasal three-ray rosette, with a subcapsular opacity overlying it and connected with it, and more superficial complete zonular punctate deposit
3 S.M. 23	O.S. 20/20–2	Deep corneal scar opposite rosette. Round pupil	Lower temporal deep anterior three ray rosette. Complete punctate zonular opacification with a heavier large opacity in it and opposite rosette. Unusually clear adult nucleus suture markings
4 H.W.D. 24	O.D. 20/20	History of eye contusion at age of 12. Vitreous pigment. Pupil deformed and drawn up. Upper nasal subluxation	Upper nasal anterior and posterior laminated opacity, with superposed granular opacity and a subcapsular opacity in front of deep opacity
5 K.E.J. 27	O.S. 20/50 +3.50D. cyl. ax. 180°	Pupil round. Upper temporal scleral scar, iris radial tear and incomplete choroidal rupture. No date of contusion. History of subnormal vision admitted	Anterior upper deep dense opacity; laminated, peripheral, translucent and continued posteriorly; deeply traversed by suture lines. Small subcapsular opacities upper temporally and nasally
6 J.A. 27	O.S. 20/33	Pupil round. Two small corneal scars below. Vitreous pigment. Chorioretinal scars below	Deep anterior upper temporal para-axial six-ray rosette. Complete punctate zonular deposit more superficially
7 L.J. 28	O.D. 20/20	History of laceration of orbital margin at 8. Scarring of upper outer orbital margin. Pupil round. No pigment in vitreous. Fundus normal	Anterior upper temporal punctate opacities at level of disjunction band, and numerous epicapsular pigment dots upper temporally
	O.S. 20/20	Pupil round. History of laceration at 18. Scarring of eyebrow remaining. Lower temporal pigmented chorioretinal scarring, with cystic formation	Anterior axial punctate opacities at level of disjunction band
8 H.A.A. 32	O.D. 20/25	Pupil round. Upper temporal faint corneal scar. Upper temporal chorioretinal scar with pigment and cyst formation	Anterior upper temporal subcapsular vacuole and dots leading down to a more axial deep irregularly outlined fluffy opacity
9 K.R. 34	O.D. 20/20	Pupil round	Deep anteroposterior hook at "12 o'clock" adjacent to fetal nucleus, with riders over riders. Congenital (?)

O.D.←Anterior Posterior Section
O.S.→Section Posterior Anterior
Section not necessarily vertical.

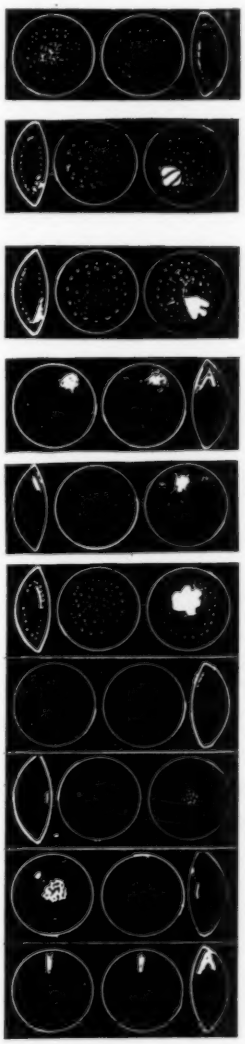
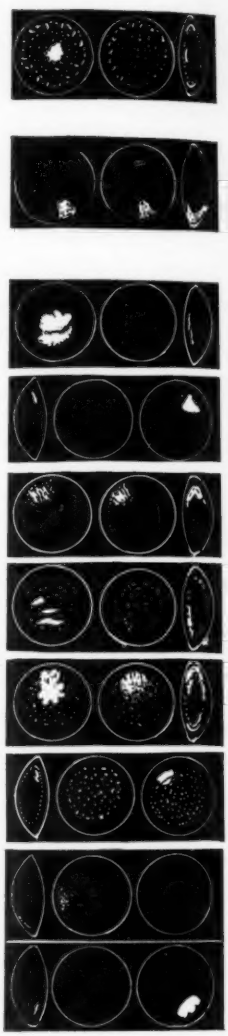


TABLE 1 (*Continued*)

EARLY ACQUIRED CONTUSION LENS OPACITIES

Number Name Age	Eye and Vision	History or Evidence of Eye Contusion	Lens Findings
10 F.W. 37	O.D. 20/20	Pupil round. Vitreous pigment. Parafoveal white dots and equatorial lower temporal pigmented chorioretinal scar	Deep anterior axial rosette adjacent to fetal nucleus, a more superficial complete punctate zonular opacity, equatorial riders still farther peripherally
11 Loc. M. 38	O.D. 20/20	O.S. large scar in eyebrow from fall at age of 3. O.D. smaller. Pupil round. Episcleral pigment near lower nasal limbus. Occasional nonpigmented dots on lower nasal Descemet's. Wing-shaped patch of retinitis proliferans with apex at disc nasally, and pigmented scars and cystic formations above it	Equatorial anteroposterior perinuclear opacity with riders over riders lower nasally and a large round annular opacity posteriorly subcapsularly, suggestive of a rupture
12 C.Ph. 38	O.D. 20/70	Struck by a baseball bat at age of 10 years	Deep axial rosette-like opacity, separated by a fissure from a deeper more irregular opacity below
13 J.J. 39	O S. 20/20	Ptosis since infancy. Pupil round	Upper temporal anterior deep triangular plaque with an incomplete punctate zonular opacification more peripherally
14 B.M. 41	O.D. 20/20	Pupil round. Lower temporal limbus scar and lower temporal linear deep corneal scar	Upper temporal perinuclear hooks with partial more peripheral punctate opacities and riders over them
15 W.A. 41	O.D. 20/20–3	Faint defect lower pupillary border. Deep upper temporal corneal scarring. Lower temporal choroidal rupture incomplete. Vitreous pigment	Deep anterior temporal and lower opacities enveloped in a complete punctate zonular opacity. Posterior epicapsular pigment below
16 W.H. 42	O.D. 20/20	Pupil round. Vitreous pigment. Lower temporal pigmented chorioretinal scar near disc	Deep seven-ray para-axial upper rosette, a more peripheral complete granular zonular opacity, with riders over riders more peripherally over rosette
17 T.A. 42	O.S. 20/20	Pupil round. Pigmented scarring of lower temporal fundus	Anterior upper nasal deep plaque with two rays not in same plane. Complete punctate zonular opacity more peripherally
18 Y.R. 45	O.S. 20/20	Pupil round. Vitreous opacities	Posterior nasal subcapsular sector of opacification and posterior polar vacuolization
19 G.A. 52	O.S. 20/20	Numerous fine corneal scars. An imbedded bit of rock deep temporally. No history of exposure. Pupil round	Lower temporal deep three-ray rosette. Incomplete punctate zonular opacification more peripherally

O.D.←Anterior Posterior Section
O.S.→Section Posterior Anterior
Section not necessarily vertical



with age of opacity known; the majority of unknown age but with objective evidence of a contusion origin or morphologically characteristic of one. These are gathered in table 1.

Tables 2, 3, and 4 deal with lens lesions in persons less than 31 years of age, in persons of the ages of 31 to 50, and in persons past 50, respectively.

Excluded were cases of lens luxations and subluxations not presenting evidence of lens opacification, cases coming up for

TABLE 2

CONTUSION LENS OPACITIES AND CATARACTS IN PERSONS UP TO 31 YEARS OF AGE

Number Name Age	Date and Nature of Accident	Date of First Medical Attention. Nature of Injury	Period of Observation	End Results		
				Eye Vision	Cornea, Sclera, Pupil, Iris, Vitreous, Fundus, and Other Data	Lens Findings
20 O.P. 20	10/12/38 Struck by brass strip containing nail	Same day. Corneal abrasion. Lens opacity noted one month later	¾ year	O.S. 20/25	Stellate upper temporal corneal scar. Temporal chorioretinal scarring. Pupil deformed and larger. Iris transillumination below	Upper temporal large tenuous subcapsular opacity made up of vacuoles and lamellar separation lines, and an anteroposterior hook-shaped opacity deeper underneath. Subluxation and club-shaped opacities lower nasally
21 G.J. 23	4/14/37 Struck by a rope that snapped	Same day. Corneal abrasion. Hyphemia. Vitreous hemorrhage	2 years	O.D. 20/2	Pupil round. Transillumination of iris at "8 o'clock." Retinitis proliferans below. No vitreous pigment	Upper temporal and lower nasal anterior and posterior continuous subcapsular opacities with evident recession of anterior layer after two years
22 C.F.J. 26	7/19/37 Struck by tire rim	Same day. Skull and right zygoma fractures. Posterior star-shaped lens opacity noted 3 weeks later	1½ years	O.D. 20/200	Pupil deformed, and lower iris transillumination. Macula lesion. Vitreous pigment	Lower nasal subcapsular anterior opacities at first and coronary opacities O.U.
						Later deep anterior laminated rosette, deeper smooth, peripheral granular and posterior cortical axial opacification and radial water clefts
23 F.Ch. 30	8/24/36 Struck by tire rim	Same day. Corneal abrasion. Hyphemia. Vitreous hemorrhage	2 years	O.D. 20/20	Iridoplegia but no deformation. Nontransilluminating upper temporal radial iris tear. Vitreous pigment	Subcapsular upper temporal anteroposterior opacities with vacuolization and recession to anterior disjunction band in 3 years
24 L.I. 31	2/2/38 Struck by broken machine-strap	Same day. Hyphemia. Subluxation	1 year	O.D. 20/33–3	Pupil deformed. Upper nasal transillumination and iris atrophy	Stellate capsular opacity with distortion of beam and shagreen-free surround at "12 o'clock." Upper temporal and upper nasal subcapsular opacities. Posterior upper nasal porous subcapsular opacity. Subluxation nasally
25 B.D. 30	10/5/37 Struck by fly-wheel rope	Same day. Corneal abrasion. Hyphemia. Lens opacity noted 6 weeks later	½ year	O.S.	O.D. amblyopic	Anteroposterior subcapsular opacities at "12 o'clock" and at "7 o'clock"

O.D.← Anterior Posterior Section
O.S. →Section Posterior Anterior
Section not necessarily vertical

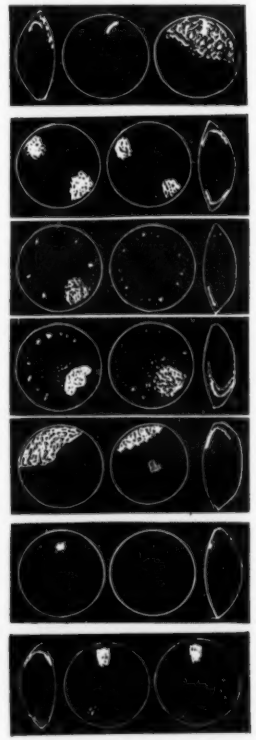
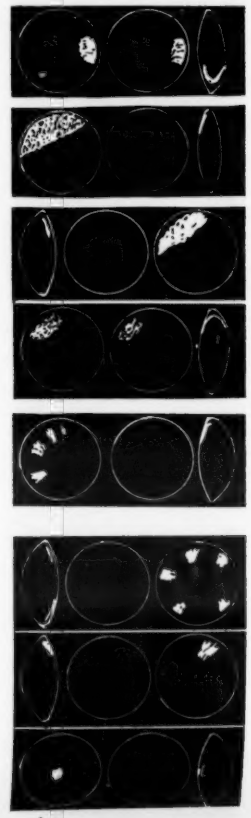


TABLE 3

CONTUSION LENS OPACITIES AND CATARACTS IN PERSONS BETWEEN 31 AND 50

Number Name Age	Date and Nature of Accident	Date of First Medical Attention. Nature of Injury	Period of Observation	End Results		
				Eye Vision	Cornea, Sclera, Pupil, Iris, Vitreous, Fundus, and Other Data	Lens Findings
26 C.F. 33	7/28/37 Toy shell explosion	Same day. Corneal abrasion. Lens opacity noted 2 months later	1½ years	O.D. 20/33	Pupil deformed. Corneal scar. Nasal synechiae. Iridodialysis nasally. Vitreous pigment. Upper temporal fundus scar	Nasal laminated anterior and posterior opacities. Recession to adult nucleus noted in 18 months
27 S.R. 35	1/7/38 Third-rail contact	Same day. Severe burns of face and head both sides. Eyes not examined until 1½ yrs. later at Bureau	1½ years	O.D. 20/20	Pupil round	Anterior upper temporal tenuous subcapsular layer of vacuoles and punctate and linear opacities; morphologically a contusion opacity but possibly an initial stage of an "electric" cataract
28 I.F. 35	4/3/37 Struck by lift crank and thrown a distance of 20 feet	Same day. Hyphemia. Lens opacities noted 8 months later	2½ years	O.S. 20/50	Pupil deformed. Iris tear upper nasally. Vitreous pigment. Refraction +4.50 D. cyl. ax. 105°. O.D. also perforating injury	Faintly rosette-shaped anterior cortical opacity at level of disjunction band when last seen
29 McI.D. 35	4/16/38 Struck by high-pressure hose	Same day. Iridodialysis	1 year	O.D. 20/40	Pupil deformed. Large iridodialysis. Center adherent to lens. Rest of iris depigmented throughout	Upper temporal faint anteroposterior continuous subcapsular opacity
30 G.E. 41	2/10/39 While greasing with air hose gasoline (?) splashed in eye	Same day. Hyphemia	½ year	O.D. 20/20	Occasional brown Descemet's dot. Discrete pupil border notches temporarily. When seen at first, 2 months after accident, temporal fundus periphery showed punctate hemorrhages, later replaced by pigment	Upper and temporal subcapsular striate opacities
31 M.C. 37	1/22/36 Struck by stone during blasting	Same day. Hyphemia	3½ years	O.S. 20/25–3	Pupil deformed and larger. Iris transillumination upper nasally, scattered corneal scars. Vitreous pigment	Wreath of subcapsular anterior opacities with recession noted last as far as disjunction band
32 U.J. 40	7/8/38 Struck by stone	Same day. Corneal erosion	1 year	O.S. 20/40	Pupil deformed. Temporal transillumination of iris. Temporal limbus scarring. Yellowish foveal lesion and upper temporal fundus scar	Upper temporal radial subcapsular anterior opacities, posterior epicapsular pigment. Recession to disjunction-band level only in one year
33 J.S. 42	6/12/37 Knocked down by motor car	Same day. Gen. pract. notes exophthalmos, poor vision, and indistinct fundus	1 year	O.D. 20/20	Deformed pupil. Radial transillumination of iris above and and below. Refraction −2.25 cyl. ax. 150°	Anterior axial subcapsular vacuoles and a deeper rosette opacity in cortex

O.D.←Anterior Posterior Section
O.S.→Section Posterior Anterior
Section not necessarily vertical



34 A.P. 42	2/10/38 Struck by snapped sewing-machine belt	Same day. Contusion	1½ years	O.D. 20/20	Deformed pupil with border notch below	Lower nasal anterior subcapsular striate opacities. Recession to disjunction-band level in only 1½ years
35 McA. 43	9/12/35 Struck by motor car	Same day. Fractured skull. Right face lacerations and other injuries	2½ years	O.D. 20/200	Pupil deformed. Upper temporal iris transillumination. Vitreous pigment. Lower temporal fundus scar. High error of refraction and preëxisting subnormal vision, O.U.	Upper temporal subcapsular anteroposterior opacities
36 M.G. 44	10/7/38 Struck by chip of stone	Same day. Contusion	¾ year	O.D. 20/20	Pupil round. Vitreous pigment	Two nasal subcapsular opacities
37 Kr.F 45	10/17/38 Struck by hard polishing brick	Same day. Chemosis, ecchymosis, iridoplegia, and iridodialysis	1 year	O.D. 20/200	Pupil deformed. Upper temporal iris transillumination. Vitreous prolapse above	Upper temporal anterior subscapsular opacities. Epicapsular posterior upper temporal pigment. Posterior axial iridescence at second examination. Cataract later
38 C.S. 45	2/3/34 Struck by die	Same day. Chemosis	6 years	O.S. 20/50	Pupil deformed. Upper temporal and upper nasal radial iris transillumination. Vitreous pigment. Case closed in 1935 with vision of 20/20–4	Posterior lower temporal subcapsular opacity. Anterior cortical suture separation. Wide-spread anterior subcapsular vacuolization noted once, to disappear later, coincident with diminution of a deeper zonular deposit of dots
39 K.E. 45	3/29/38 Tank explosion	Same day. General injuries. No data about left eye except for senile pupillary border dystrophy	1 year	O.S. 20/66	Pupil deformed. Vision deteriorated from 20/20 with a +4.00 D. sph. O.D. lower nasal cuneiform opacities	Posterior saucer-shaped opacification and anterior subcapsular equatorial haze later
40 Qu.W. 45	8/7/38 Struck by tree branch	4 days later. Corneal abrasion and keratitis	1 year	O.S. 20/50	Pupil round. Lower temporal corneal scar. Temporal meridional scleral scar, Lower nasal incomplete choroidal rupture. Vitreous pigment. Vision at first 20/20	Coronary opacities, O.U. Annular posterior epicapsular pigment, later much diminished. Anterior and posterior water-clefts and anterior plaques both present in contused eye only
41 Y.J.J. 48	8/10/38 Struck by something while hammering	Same day. Ecchymosis. Conjunctival cyst formed, incized, and cauterized	1 year	O.S. 20/20–3	Pupil round. Vitreous opacities. Lower temporal chorioretinal scar	Coronary opacities, also present in O.D. but heavier and more superficial temporally, and underlying them a heavy, hook-shaped opacity lower temporally, and posterior epicapsular pigment lower temporally
42 C.A. 49	1926 No data	No data	13 years	O.D. 20/20	Pupil round	Wreath of deep anteroposterior continuous hooks

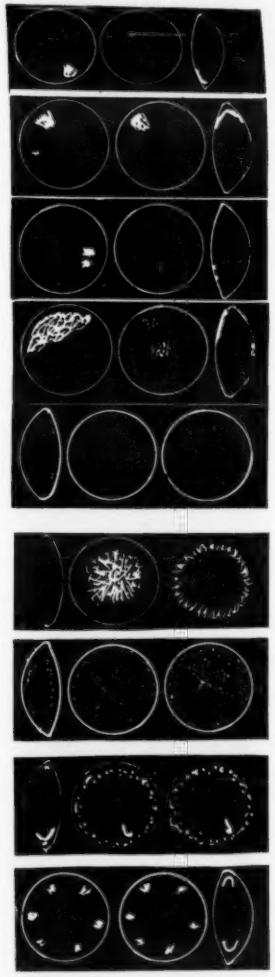
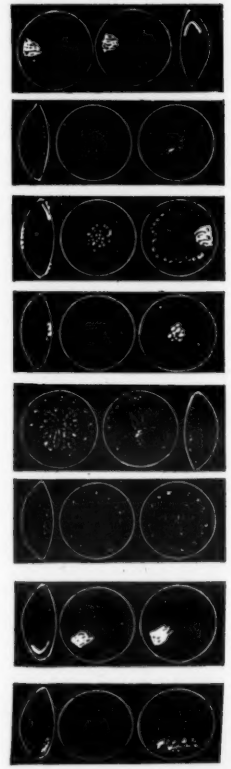


TABLE 4

CONTUSION LENS OPACITIES AND CATARACTS IN PERSONS PAST 50

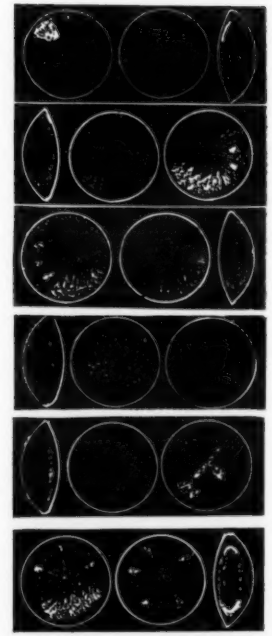
Number Name Age	Date and Nature of Accident	Date of First Medical Attention. Nature of Injury	Period of Observation	End Results		
				Eye Vision	Cornea, Sclera, Pupil, Iris, Vitreous, Fundus, and Other Data	Lens Findings
43 Ch.S. 51	11/6/36 Struck by iron bar	Same day. Ecchymosis, corneal abrasion, iridodonesis, hypertension	1 year	20/33 O.D.	Pupil deformed. Iris transillumination. Lower temporal chorioretinal scar	Temporal superficial cortical anteroposterior opacities
44 A.R. 52	9/29/38 Boiler explosion	Same day. Fractured nose. Hematoma and foreign body lower lid	½ year	O.S. 20/70	Pupil deformed. Upper temporal radial tear. Vision deteriorated from 20/30	Anterior water-clefts. Posterior saucer-shaped noniridescent subcapsular opacification
45 O.F. 52	10/7/38 Struck by bundle of paper shot out under pressure	Same day. Lower temporal laceration. Hyphemia. Intraocular hemorrhage. Iritis	1 year	O.S. 20/200	Lower temporal corneoscleral scarring. Pupil deformed. Annular synechiae. Lower iris atrophy. Vitreous pigment	Annular anterior epicapsular pigment. Temporal anterior subcapsular opacity. Posterior axial subcapsular opacification noted at second examination. Later cataract
46 C.J. 52	12/1/38 Struck by chip of stone	Same day. Hyphemia	1 year	O.S. 20/20	Pupil round. Vernal conjunctivitis, O.D. Amblyopia ex anopsia	Anterior axial subcapsular vacuolization. Later water clefts. Neither present in O.D.
47 T.F. 53	1926 Struck by stone	Same day. Iridodialysis. Lens opacities recorded 2 months later	12 years	O.D. 20/66	Lower nasal corneal scarring. Pupil deformed. Lower nasal iridodialysis. Closed in 1927 with 20/40	Axial anterior and posterior cortical water-clefts and anterior opacities lying about one corneal thickness deep. Coronary opacities
	3/24/37 Struck by stone	Same day. Hyphemia	2 years	O.S. 20/33	Pupil round	Anterior and posterior water-clefts and coronary opacities. See O.D. above. Note hyphemia only finding
48 N.V. 54	4/26/37 Struck by awning rod	Same day. Laceration of sclera. Hypertension	2½ years	O.S. L.P.	Lower nasal scleral scarring. Large deformed pupil. Lower nasal Descemet's rupture. Brown deposits on Descemet's. Pigment in vitreous. Glaucomatous cupping	Lower nasal deep anteroposterior opacities. No opacities present in O.D.
49 A.G. 54	1/18/38 Struck by iron bar	Same day. Corneal laceration. Intraocular hemorrhage	½ year	O.S. 20/50	Pupil deformed. Iris transillumination below. Iridodonesis. O.D. vision 20/40 with +3.50 D. Sph. Posterior synechiae below	Anterior subcapsular and cortical cuneiform opacities

O.D.← Anterior Posterior Section
O.S. →Section Posterior Anterior Section not necessarily vertical



O.D.←Anterior Posterior Section
O.S.→Section Posterior Anterior
Section not necessarily vertical

50 F.D. 56	3/30/37 Struck by stone	Same day. Corneal laceration	2 years	O.D. 20/25	Pupil deformed. Upper temporal corneal scar	Upper temporal anterior striate subcapsular opacities, with faint rosette outline receding to disjunction band in one year
51 G.N. 60	10/15/38 Struck by coat hanger	Same day. Intraocular hemorrhage	1 year	O.S. 20/200	Old corneal scarring accounting for subnormal vision O.U., but vision O.D. is 20/66	Posterior epicapsular blood remains and posterior subcapsular opacification—greyish, homogeneous, and at level of disjunction band
52 W.T.S. 62	11/10/37 Glasses struck and broken by whipping-machine plug	Same day. Conjunctival laceration. Subluxation. Macular edema	2 years	O.D. 20/200	Pupil deformed. Temporal iris transillumination. Senile cuneiform and coronary opacities O.U. Vision deteriorated from 20/33. Vision O.S. remains 20/20–1	Anterior temporal striate subcapsular opacification. Coronary opacities. Later posterior axial iridescence
53 Sch.F. 65	11/14/38 Motor-car accident	Same day. Conjunctival laceration. Intraocular hemorrhage	1 year	O.S. 20/33	Temporal scleral laceration. Temporal scleral translucent plaque at 3 o'clock adjacent to limbus. Posterior synechia at 5. Senile cuneiform opacities O.D.	Three small anterior temporal subcapsular opacities, with recession in one year to disjunction band. Posterior epicapsular streaky blood remains, later to give to capsule frosted-glass appearance
54 S.R. 70	4/18/38 Struck by tree branch	Same day corneal abrasion	1 year	O.S. 20/40	Lower nasal corneal scar. Senile cuneiform opacities lower nasally O.U.	Lower nasal cuneiform lens opacities. Water-clefts anteriorly beginning to opacify. Annular posterior epicapsular pigment
55 R.J. 74	11/1/37 Struck by bundle	Same day. Chemosis and ecchymosis	2 years	O.D. 20/200	Pupil deformed. Posterior synechiae below. O.S. operated on for a lamellar cataract 20 years before, O.D. being the better eye. Vision O.D. deteriorated from 20/66	Only a lamellar cataract when first seen. Later increasing anterior cortical plaques and cuneiform opacities came to overlie lamellar cataract and water-clefts; cuneiform opacities and posterior iridescence noted



examination already in a state of "cataract," aphakia, or anophthalmos, in which there was no opportunity to study the earlier findings at the Bureau, and a few cases still under observation and too early to report upon, and doubtful cases.

In medico-legal examinations, the anamnesis and history clearly have to be subordinated to objective methods and, in the case of the lens, to biomicroscopy, on which the examiner has to learn to depend entirely. It should be pointed out, however, that with two exceptions all the patients in tables 2, 3, and 4 received medical attention for their contusions within 24 hours. In New York City the workers are fully educated as to the protection they are entitled to under the Workmen's Compensation Act and in practically all cases medical attention at the hands of competent ophthalmologists is prompt and accessible. This fact may also be considered an evidence of the diagnostic value of a history of pain as a constant initial symptom of an eye contusion, although it may abate in a few days.

While the diagnosis of an eye contusion, in the absence of reports or early observations of an ophthalmologist, is less easy than that of a perforation, it should present little real difficulty.

A previous study[17] of a group of minor eye contusions, undertaken for the purpose of testing the medico-legal diagnostic significance of the anterior-segment-trauma syndrome of the late Henri Frenkel, clearly brought out its importance. It should be better designated, however, as the anterior-segment-contusion syndrome, since it does not apply to perforations which are also covered by the term "traumatic."

That study led to the conclusion that a retrospective diagnosis of an eye contusion can be made with practical certainty in the presence of certain indications in the iris, lens, vitreous, and fundus, occurring in various combinations, and anatomically related and remaining practically throughout life.

Sixty percent of the cases tabulated in that study exhibited principally subcapsular lens lesions (abbreviated to "capsular" in tabulation inadvertently). The high incidence of lens lesions in contusions, noted in that study, is rarely referred to in the literature and forms, next to pupillary deformation, the most constant evidence of an eye contusion.

The present study was undertaken for the primary purpose of determining the extent to which, aside from the concomitant evidence of an anterior-segment-contusion syndrome, there is a specific lens lesion morphology due to contusion. In practice, of course, it is rarely necessary to execute this diagnostic feat by examining a lens *in vacuo* as it were. Such a demand, however, is made on us in the diagnosis of a case of lens opacity acquired in early youth, in which the anterior-segment-contusion syndrome is much less pronounced than in the adult, and examined many years afterwards. In persons past 50 years, in whom the anterior-segment-contusion syndrome may be complicated by preëxisting senile lens lesions, we are faced with the same problem. In a case of complete "cataract," the vitreous and fundus are not available for examination and the iris lesions less readily identifiable, and a study of the lens *per se* is demanded of us.

Considering the varying and indeterminate severity of an eye contusion which may affect the morphologic picture at any age and the size of the material analyzed, any generalizations in regard to the specific morphologic picture of contusion lens lesions at different age periods must, in the nature of things, be regarded as provisional. On the other hand, considering that the idea of a specific morphology can be conceived of only in terms of the net result of the age of the individual,

of the age of the lesion, and the changes which the lens-suture-system architecture undergoes with age; that the assembling of a much larger material would have to be spread over a correspondingly much larger number of years, and considering the evident trend in the material there is justification for this attempt. The writer also hopes to have the opportunity of reviewing the same material after the lapse of another five years.

An examination of the 20 cases of table 1 (two in the same individual) warrants considering the whole group as one of juvenile-contusion lens opacities. Two cases (5 and 9), because of the depth and density of the opacity, might be considered as antenatal. In the rest, either a history or evidence of a contusion, such as a corneal lesion, iris lesion, pigment in the vitreous, a fundus lesion, and in some cases more than one evidence, support that assumption.

With the exception of four eyes (cases 1, 7, 8, 10), in one of which a para-axial lesion remains, all the opacities are paraaxial and lie in the adult nuclear zone. Some are adjacent to the fetal nucleus. In only five does the principal opacity take the form of a definite rosette, with rounded-off points of the rays and ending at about the equatorial limit of the fetal nucleus, at any rate quite a distance from the lens equator. In the others the opacity is best described as a formless plaque. In some cases the principal opacity is made up of two or more laminae separated by fissures of various width and sometimes lying in different planes not parallel with each other. In other cases the opacity is continuous across the equator with a more or less similarly shaped opacity lying in the posterior adult nuclear zone, and often accompanied by riders over riders with bridging between them suggesting a process of lamellar dissociation at one time. In 11 of the cases there is found a more peripheral homogeneously granular or punctate layer of opacification with a definitely zonular distribution, only in a few cases not complete. This layer is generally denser opposite the principal opacity than elsewhere. Posterior epicapsular pigment has been observed in two cases, and anterior epicapsular pigment in only one. In only four cases was the original site of the subcapsular lesion indicated opposite the principal opacity, in one case quite pronounced (case 4), and in only one case was there indication of a posterior-capsule lesion (case 11), and in one case only was the opacity confined to the posterior subcapsule (case 18).

Considering the group as a whole and noting the extreme rarity of an iris involvement, which is so conspicuous a feature of the anterior-segment-contusion syndrome in the adult, the absence of evidence of subluxations, the rarity of capsular or subcapsular remains of the original site of the lens contusions, and the relative frequency of vitreous pigment and fundus lesions, one must assume a different mechanism for an eye contusion in the young from what obtains in the adult. To consider as factors are the iris elasticity, the capacity of the lens to assume a more globular form in accommodation, which may reasonably be assumed to take place in synergy with the reflex protective miosis, and the elasticity of the zonule. Under such circumstances the brunt of the contusion is more likely to be borne by the retinal-zonule insertion rather than by the lenticular-zonule insertion. In the evolution of the lens lesion there is also to be considered the capacity of the young epithelium to regenerate. From the amount of recession, practically the same in the majority of the cases, with the exception of six with dates, they may be assumed to have occurred some 10 years before observation. The de-

velopment of the more peripheral amorphous or punctate zonular layer of opacification and riders suggests an abiotrophic process affecting the succeeding layer of lens fibers to be deposited following a contusion. The effect of these opacities on visual acuity is minimal in general.

The second group of six cases in table 2 comprises those observed from the beginning for varying periods and occurring at an age period when the lens is still growing in thickness, which ceases, according to Sala and Alajmo,[18] after the age of 30 years, except in the presence of high errors of refraction, when it continues to grow in thickness up to the age of 40. The growth in thickness, they found by actual measurements, amounts, for the whole decade between 20 and 30, to about 0.3 mm., as compared with the growth for the first two decades of about 0.7 mm. When applied to the anterior cortex, these figures should be halved, of course.

This group may be considered therefore a transition group between the juvenile and the adult eye contusion, and the morphologic picture of the lens lesions is approximately the same as in the first group except that their early stages are represented here.

In this group the early stages of the contusion lens lesion can be seen as an anterior subcapsular lesion made up of dots and lines with vacuolization and lamellar separation, more commonly hidden under the iris but sometimes involving almost half of the lens subcapsule. Occasionally, the tapering ends of the lines and the bulging out at the middle suggest suture separations. Their appearance is recorded as early as a month. A posterior star-shaped lens opacity is recorded as having been observed in three weeks, to disappear later as such and remain only as a sectorlike posterior subcapsular opacity and be overshadowed by the development of an anterior rosette and riders and anterior water clefts and superposition of a more peripheral punctate layer of opacification, all in the space of 1½ years, together with deterioration of vision to 20/200 (case 22). In four of the cases there is a quite early continuation across the equator and involvement of the posterior subcapsule but to a lesser extent in area and with a more striate texture. A stellate anterior capsular opacity was noted in one case (case 24) apparently from a deep indentation of the cornea by the blunt end of a small-caliber wire. This need not be considered as a capsule rupture necessarily, and may represent merely capsular epithelium proliferations, such as one sees in old cases of siderosis. Such formations and capsule folds are often interpreted as ruptures. The subcapsular situation, the tendency to cross the equator, the segmentlike localization, all make the diagnosis of a contusion lens opacity from the morphologic picture alone quite easy. The pattern and its irregularities are evidently related to the irregularities of the subcapsular suture system.

The group of patients in table 3 have suffered an eye contusion in the age period in which Sala and Alajmo find the growth of the lens in thickness practically stationary at about 4.2 mm. Deposition of new layers of lens fibers continues, however, and Vogt and Galatti find the anterior cortex increasing in thickness during the whole period at the expense of the nucleus by about 0.15 mm. Morphologically, the lens lesions are still characteristic in the first two thirds of the age period, that is up to about 45 years. There is, however, a greater tendency to multiple-sector involvement, wreathlike, observed in three cases (cases 30, 31, and 42). Recession, which theoretically should hardly pass the disjunction band, has been noted much deeper, in only 1½ years (in case 26) as far as

the adult nucleus, while in another case the recession after 5 years was noted to be to a depth of one corneal thickness (case 38), which is less than in the preceding case but still much more than is theoretically possible.

Toward the end of this age period one notes the appearance of coronary opacities, posterior subcapsular involvement with iridescence, and both anterior and posterior water-clefts, reminding one of presenile, senile, and pathologic lens processes, except that no typical senile cuneiform opacities are observed. That we are dealing with actual activation of such processes and not mere coincidences is evidenced by a more superficial situation and regional intensification or sole appearance in the contused eye, as in cases 37, 38, 39, 40, and 41. In case 37 posterior iridescence was noted within one-half year after contusion. In case 38 after 5 years only. In case 39 a posterior saucer-shaped opacification was noted to develop within 5 months to reduce vision from 20/20 to 20/66. In case 40 water-clefts appeared in the contusion lens of the contused eye only, after an observation of 6 months, and in case 41 coronary opacities were present in both eyes but regional intensification and the appearance of an extra-heavy hook-shaped opacity in the sector of the corneal scar were noted.

The massing of the cases of rapid progression of lens lesions and of sudden deterioration after a stationary period, the latter condition observed more frequently after perforating injuries, all occurring at about the age of 45 years, deserves notice. That a patient with an inappreciable loss of visual acuity (whose case was closed after one to two years of observation) does come back after an interval of five years (in cases of perforating injuries after as many as 25 years), generally when he is 45 years old, with a history of stationary vision but rapid deterioration in the preceding few months, would suggest the possibility of error in regarding such cases as early progressive contusion cataract and attributable to a contusion, real or assumed, occurring at the same time. Such cases of past contusions, if not compensation cases and of record, may easily and in all honesty be forgotten or overlooked in the anamnesis. The causal relation therefore of "cataracts" observed three or more days after a presumed contusion with objective evidence of a contusion, and without a history of pain sufficient to make the claimant seek medical attention must be approached with this possibility in view. Their disposition, however, often has to rest on legal benefit of doubt rather than on ophthalmologic criteria, with the benefit thrown sometimes to one and sometimes to the other side of the scale. A true contusion, of course, can aggravate a preëxisting contusion lens opacity, and the legal rule of holding the determining cause responsible then comes into play.

The disposition of the case is, of course, the prerogative of the Industrial Board, not that of the writer.

Table 4 comprises cases of contusions occurring after the age of 50 years. The growth of the lens in thickness begins anew, according to Sala and Alajmo, and amounts to 0.25 mm. for the anterior cortex in the period between 50 and 60 years. This is the result of water imbibition rather than of deposition of new lens layers, and the growth of cortex at the expense of nucleus has practically ceased (Vogt and Galatti). These cases may be properly described as of the senile type of contusion opacities of the lens, in analogy with what Vogt describes as the senile type of the complicated lens opacity. While in a third of them the contusion lens opacities are still morphologically characteristic, with subcapsular beginning, regional localization, and

equatorial progress to posterior subcapsule, the factor of senescence makes itself manifest by a greater frequency of intravitreous hemorrhages and subluxations in the mechanism, and in the pathology by greater incidence of posterior epicapsular pigment, posterior synechiae, hypertension, saucer-shaped iridescent posterior opacification, and by both anterior and posterior cortical water-clefts.

In this group three factors combine to make the differential diagnosis more and more difficult; namely, the frequently preëxisting subnormal vision, the appearance of the characteristically senile cuneiform opacities, and a slower evolution. To these should be added the fact that in the senile type of complicated lens opacification there may appear anterior axial and equatorial subcapsular opacities in most respects indistinguishable from those seen in contusions in the younger persons. An apparently distinguishing characteristic exists in the fact that while the anteroposterior contusion lens opacities are continuous across the equator, the presenile and senile opacities often end in a line concentric with the equator anteriorly and posteriorly, without bridging between them. Axial illumination with the ophthalmoscope immediately attracts attention to the posterior-concentric-line phenomenon, and biomicroscopy at first glance seems to confirm it. Careful focusing, however, shows it to be an illusion and merely the result of the overriding of concentric lamellar opacities permitting light to pass between them, or else of an interposition of a water-cleft close to and concentric with the equator. On the other hand, the so-called fusion of cuneiform opacities, which is described as giving a group of sectorlike wedges the appearance of a segment, generally more characteristic of a contusion opacity, and often marked by a heavy hemlike border, is more likely to represent the same lamellar dissociation phenomenon anteriorly that is represented by the posterior-concentric-line phenomenon.

Note cases 52, 53, and 55, which represent the senile type of contusion opacities with cuneiform morphology.

In this age group, therefore, our only guide, in the presence of the easily diagnosed anterior-segment contusion syndrome or other clear-cut first observations of hyphemia or intravitreous hemorrhage, is logically to assume an originally equal preceding process in the two eyes.

Summarizing the diagnostic problems, an analysis of the material presented shows that contusion lens opacities are morphologically characteristic and their diagnosis, even in the absence of an anamnesis or initial observations, can be made with certainty up to the age of 45 by the subcapsular beginning, equatorial spanning, and regional segmentlike localization. After the age of 45, their diagnosis rests on the concomitant evidence of an anterior-segment contusion syndrome, on a careful anamnesis with reference to previous contusions, careful weighing of the findings in the lens, sector by sector, and of the findings in the lens of the fellow eye. The complete contusion "cataract" cannot be distinguished *per se* from a complicated "cataract." There is lack of evidence from this material for either a posterior- or an anterior-capsule rupture intervention in the contusion lens lesion.

Determination of the age of a lens opacity from its depth alone cannot be made. "Remotio cataractae traumaticae" is, of course, an established fact. But, while a deep opacity argues for age, the converse is not true, and a superficial one may be quite old. The material analyzed—and an analysis of the cases of Vogt, Law, Lugli, Alajmo, and Cattaneo—exhibit a too widely varying rate of recession into the depth of an opacity found at all ages. The factors to consider

are: adherence of the opacity to the lens capsule; atrophic and hypertrophic reactions in the neighborhood of the original lesion; the discontinuity surface divergence as we approach the equator from the axis of the lens; the factor of deposition of new lens fibers after the thirtieth year, involving compression of the older lens substance, the evolution of the suture-system architecture and its changing form, from zone to zone, and the factor of aqueous imbibition after the fiftieth year of life. Of these, the factor of compression, principally responsible for both the form and the depth of the opacity and its biochemical shielding, so that it becomes stationary and cured, would seem the most important one. It is therefore in its terms that the age of an opacity can be gauged rather than by its depth. Hence, as to age, the density of an opacity is a more important criterion than is its depth. This, however, is not susceptible to measurement.

Finally, eye contusions in infancy and adolescence are common occurrences, to judge from their high incidence in the material presented, which covers only 1½ years of observation; and many a lens opacity is described as "congenital" or "senile," depending on the age at which it is first observed, but quite often on analysis is found to be of contusion origin.

Prognostic problems in compensation cases

Because of statutes of limitation of liability of carriers in many of the states, because insurance and private employers occasionally liquidate their business, and in order to insure the worker's confidence in the equity of the administration of workmen's compensation, it is extremely important not to declare a case stationary and to put on the worker the burden of reopening the case many years later, sometimes under handicaps. In the case of the lens, we are dealing with an organ particularly subject to the vicissitudes of age, in general, and obviously increasingly so in the case of the traumatized lens.

As can be seen at a glance at the table of the early acquired lens opacities, and considering the advanced age at which most of them were examined, one can say quite definitely that those acquired before the age of 20 years (and most of them apparently were), will remain stationary, unless there is an early cataract from unusual severity of the contusion.

In the second group, that is, in persons up to 31 years of age, lens contusions, if accompanying mild eye contusions, are also stationary. After 30, the prognosis is not so favorable. Out of a group of 34 cases studied in 1935 for the mild sequelae of eye contusions, and checked up for any reopenings since, only one case (No. 38 of this series) has been reopened because of the progress of a lens lesion after a lapse of 5 years, the contusion having occurred when the patient was 40 years old. This present study includes major as well as minor eye contusions accompanied by lens lesions. It would seem, therefore, that in contusion lens lesions observed after the patient has passed the age of 30 years, prognosis should be more guarded, and the patients kept under observation longer than is customary, perhaps as long as three years as a minimum. This would provide, under the statute of limitations of 7 years of the State of New York, for the carrier's liability for about 10 years, in case of still further deterioration in the course of the later forties, apparently the most serious period. Because of the possibility that uncorrected presbyopia may be a factor in the deterioration, early provision of classes by the carrier is also advisable in all cases in this group.

Conclusions

1. The use of the term "cataract" to

describe all kinds of lens opacities, regardless of their extent and effect on visual acuity, is confusing and gives rise to misunderstandings. It should be restricted to designate complete lens opacifications.

2. Our preslitlamp knowledge of the lens was meager and imprecise, and the textbooks and literature of that period reveal a too considerable confusion and uncertainty in dealing with the medicolegal aspects of lens opacities and cataracts due to contusions to be invoked with propriety in medicolegal controversies.

3. The slitlamp has taught us to recognize the specific ages of lens zones, the specific morphology of the results of mechanical injury, the fact of "remotio cataractae traumaticae," and has furnished us with a biomicroscopic technique of equal status with the histologist's technique. It has dispelled some previous misconceptions as to the rôle of posterior-capsule ruptures from contusions, establishing their rarity, of anterior-capsule macroscopic ruptures, found also to be rare, and of equatorial-capsule ruptures, similarly nondemonstrable, and has served to call our attention to the biochemical rôle in the production of lens opacification along with the mechanical factors in contusions. It has also enabled us to verify the activation of presenile and pathologic processes in a lens by contusion.

4. An analysis of the examination of 57 eyes with contusion lens opacities of a wide variety of ages establishes a morphologic specificity of juvenile and adult contusion lesions up to the age of 45 years, on the basis of subcapsular beginning, equatorial- and posterior-lens-involvement tendency, and regional segmentlike localization. It shows that after the age of 45 years senile pathologic changes intervene to make less discernible the specific morphology of contusion lens opacity. It is not possible to designate the age of a lens opacity with any accuracy from its depth alone because of the widely varying rate of recession into depth that has been observed. The density of an opacity resulting from compression in course of time is a more important clue than depth, but it is difficult to measure accurately.

5. The prognosis of contusion lens opacities occurring before the age of 30 years is good. After that age, it should be guarded and the lesion not declared stationary until a period of observation of 3 years has passed, in order to take care of statutes of limitation in the administration of workmen's compensation and protect the claimant against future deteriorations.

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SOME OBSERVATIONS ON THE USE OF SULFANILAMIDE IN TRACHOMA AND ASSOCIATED OCULAR CONDITIONS*

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The preliminary report of Dr. Loe on the results of sulfanilamide therapy in the treatment of trachoma encouraged us to use this drug on a number of Navajo patients suffering from this disease. The group of patients to be reported is not large, but the results are definite enough to be of interest in view of the many enthusiastic reports in literature on the use of this drug in the treatment of trachoma.

We first began the use of sulfanilamide on adult patients presenting themselves with an extremely acute bulbar conjunctivitis with or without phlyctenules or corneal ulcers superimposed on trachoma of long standing. Various degrees of scarring and pannus were present in all these cases, with granulations and trachomatous patches of the conjunctivae and of the upper lids. In the past we have found these cases extremely resistant to local treatment and nonspecific protein-shock therapy. They would frequently run a protracted course and when the acute symptoms had subsided an increased amount of corneal opacity and conjunctival scarring remained.

In 15 such consecutive cases admitted to the hospital, sulfanilamide was administered in doses varying from 4 to 6 gm. daily. As soon as some improvement was apparent, the dosage was decreased. All these cases but one showed marked improvement with regard to acute symptoms in three to four days' time and in the majority all symptoms such as photophobia, lacrimation, hyperemia and edema of the lids had subsided entirely within three weeks' time. Corneal ulcers and phlyctenules cleared more slowly. Granulations of the palpebral conjunctivae and pannus, although improved, were, however, always present at the time of discharge. This led us to speculate as to whether sulfanilamide was a specific for trachoma or merely effective against secondary conditions. We therefore ran a second series consisting of school children between the ages of 8 and 14 years, all having chronic trachoma diagnosed by an eye specialist in the Government Indian day schools.

In a group of 17 school children admitted, 9 received treatments from 21 to 24 days; 3 for 14 to 15 days, and 5 for a period of 7 to 10 days. The doses were those suggested by Dr. Loe; namely, one-

* From the Sage Memorial Hospital.

third grain per pound of body weight for 10 days and one-fourth grain per pound weight for the remainder of the course. The drug was given in 3 to 4 divided doses, followed by 5 gr. of soda bicarbonate. A daily white blood count and urinalysis were taken on every case and the hemoglobin was checked twice weekly.

TABLE 1

SULFANILAMIDE TREATMENT OF TRACHOMA IN SCHOOL CHILDREN

Case	Days	Total Dose grams	Toxic Symptoms	Condition of Eyes	Prior to Treatment	At End of Treatment
N. C.	21	24	none	Photophobia	slight	none
				Tearing	slight	none
				Pannus	slight	slight
				Granulations	moderate	slight
				Scars	moderate	moderate
				Vision	good	good
B. J.	24	27	none	Photophobia	none	none
				Tearing	none	none
				Pannus	slight	slight
				Granulations	moderate	slight
				Scars	slight	slight
				Vision	good	good
K. W.	21	24	none	Photophobia	slight	slight
				Tearing	slight	slight
				Granulations	moderate	slight
				Scars	none	none
				Vision	fair	good
B. C.	11	42	slight headache and lethargy	Photophobia	slight	none
				Tearing	slight	none
				Pannus	moderate	moderate
				Granulations	marked	moderate
				Scars	none	none
				Vision	fair	fair
M. D.	15	57	none	Photophobia	moderate	none
				Tearing	moderate	none
				Pannus	moderate	none
				Granulations	marked	none
				Vision	poor	good

In all of these cases trachoma had been present for a year or more. Clinically the cases were fairly uniform. The trachoma was chronic; the upper lids were thickened; the palpebral conjunctivae studded with granulations. Various degrees of scarring of the upper palpebral conjunctivae were present. All the cases presented a pannus visible in most cases only with a slitlamp. Most of these cases presented little photophobia, tearing, or bulbar conjunctivitis. All of them had had some previous treatment in the form of copper-sulphate drops, oil rubs, and other medication. Only two had had any curettage of the lids performed. During their stay in the hospital the only additional treatment the patients received was daily irrigations with boric-acid solution.

The effects of treatment were as follows: Tearing, photophobia, and bulbar conjunctivitis when present were definitely improved or had disappeared after three or four days of treatment. The conjunctivae of the lids became less congested and the granulations appeared

paler and smaller. Change in the appearance of the pannus occurred in one case only. Beyond the first week, however, we noted no improvement. At the end of the course of treatment, the nine patients receiving sulfanilamide from 21 to 24 days still presented granulations and velvet patches on the upper palpebral conjunctiva and the pannus was still visible with the slitlamp. Every case except one of the 17 cases treated could readily have been diagnosed as active trachoma at the end of the course of therapy. In our opinion, the results were no more striking than would be expected in any similar cases of trachoma hospitalized for the same period and given any of the usual forms of therapy. The one exception was a large well-developed girl of 12 years (see M.D. in protocol), admitted with acute conjunctivitis, severe granulations of the upper palpebral conjunctivae, and a grossly visible pannus of both corneae. This patient received 30 grains of sulfanilamide on admission followed by 10 gr. every four hours over a period of two weeks. At the end of the 10 days, this child showed

TABLE 2

SULFANILAMIDE TREATMENT OF TRACHOMA IN ADULTS

Case	Days	Total Dose grams	Toxic Symptoms	Condition of Eyes		
					Prior to Treatment	At End of Treatment
E. H.	7	30	none	Bulbar Conjunctivitis	marked	none
				Photophobia	marked	none
				Tearing	marked	none
				Granulations	moderate	slight
				Pannus	moderate	moderate
				Vision	poor	good
C. W. S.	11	37	none	Bulbar Conjunctivitis	marked	none
				Photophobia	marked	none
				Tearing	slight	slight
				Granulations	slight	slight
				Pannus	slight	slight
				Vision	poor	fair
S. D.	12	52	slight nausea and albuminuria	Phlyctenules	marked	none
				Bulbar Conjunctivitis	marked	none
				Photophobia	marked	none
				Tearing	marked	none
				Granulations	moderate	moderate
				Pannus	moderate	moderate
				Vision	poor	fair
H. J.	8	50	slight albuminuria	Bulbar Conjunctivitis	marked	none
				Photophobia	marked	none
				Tearing	marked	none
				Granulations	moderate	moderate
				Pannus	moderate	moderate
				Scars	moderate	moderate
				Vision	poor	fair
C. S.	7	35	none	Bulbar Conjunctivitis	marked	none
				Photophobia	marked	none
				Tearing	marked	none
				Granulations	slight	slight
				Pannus	moderate	slight
				Scars	moderate	slight
				Vision	poor	good

remarkable improvement, and at the termination of the course of treatment was examined by an eye specialist, who could find no evidence of active trachoma. This case differed from the remainder of the series in that she gave a history of duration of symptoms of only three weeks. In addition, her dosage was far greater than in all but one of the other children treated. One other case (B. C.), a boy of 14 years, with very severe trachoma, whose upper palpebral conjunctivae were studded with large spongy granulations and showed little scarring, received the same larger doses for a period of 11 days with only slight improvement. These two cases were the only exceptions to the drug dosage suggested by Loe.

Aside from slight headache and lassitude, the only toxic reactions to sulfanilamide observed in the series of children treated were two slight depressions of the white-blood-cell count, and a mild papular dermatitis in one other child. Two of the adults receiving larger doses showed a mild cyanosis which cleared immediately on discontinuance of the drug. The children apparently showed as much tendency to leukocytosis as to depression of the white-cell count while under sulfanilamide therapy. In no case was any significant depression of the hemoglobin or red-blood-cell count noted.

A check up on 12 of the children in our series by an eye specialist three months after therapy was discontinued showed that in all cases there seemed to be some improvement as compared to the condition of the eyes when last examined prior to treatment, and showed considerable improvement as compared with cases treated by other methods alone. In no case, however, was there evidence of a complete cure or arrest of the trachomatous process. Unfortunately, we have not been able to follow up the clinical cure referred to above.

Table 1 includes five of the children with uncomplicated trachoma. Table 2 includes five of the adults in whom trachoma was associated with other acute occular conditions.

Summary

Fifteen adults with chronic trachoma associated with other acute eye conditions, such as bulbar conjunctivitis, phlycentular conjunctivitis, and corneal ulcers, recovered rapidly from the acute manifestations under sulfanilamide therapy. In none of these cases, however, was there any evidence that the underlying trachoma was cured or even greatly improved.

Seventeen children between the ages of 8 and 14 years, with chronic trachoma and little or no bulbar or corneal involvement other than slight pannus, were treated with sulfanilamide for periods of 7 to 24 days. Only one clinical cure was obtained. The other 16 showed slight to moderate improvement. The nine patients who received treatment for 21 to 24 days showed no more improvement than those whose treatment was stopped on the seventh day.

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THE PATHOGENESIS OF RETINITIS PIGMENTOSA (SCLEROSIS PIGMENTOSA CHORIORETINALIS)

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PART I

Until the present time retinitis pigmentosa has been regarded as a process localized in the retina, originating from the nervous elements of the retina, and leading to an ascending optic atrophy with loss of sight in the terminal stage. Zondek and Köhler described, for the first time, four cases of retinitis pigmentosa in which marked disorders of the diencephalic function could be shown. Thereupon several authors—for example, Schupfer and Vogelsang—began researches in this direction which, however, did not give unequivocal results. It cannot be made out from the literature whether these studies referred to pure cases of retinitis pigmentosa or to so-called atypical cases. Tertsch studied the relation of retinitis pigmentosa to the different blood groups without being able to establish any laws. He examined several families and found all diseased brothers and sisters belonging to one blood group. Velhagen studied the symptomatology of the Bardet-Lawrence-Biedl syndrome and of amaurotic idiocy of the Spielmeyer-Vogt type. Kyrieleis pointed to the ontologic connection between the nervous visual organs and the diencephalic system.

Interesting and new results have come to light by the experimental researches of J. S. Friedenwald and Eugene Chan, who showed the resorptive process of pigment artificially brought into the vitreous chamber of a living animal.

As it still seems premature to differentiate exactly all syndromes with pigment degeneration, the following paper will deal exclusively with the well-known classic syndrome of typical retinitis pigmentosa, evaluating the latest knowledge concerning it.

GENERAL SYMTOMATOLOGY

I. Entirely new perspectives appear after an evaluation of Blobner's objective and courageous paper on therapeutic failures following sympathectomy at the Ophthalmological Clinic of Prague University. There it was desired to reexamine the contradictory results of Magitôt and Löwenstein. In 1934, Magitôt had sympathectomized six patients according to the method of Leriche-Doppler and had reported remarkable improvement both in vision and in the visual fields. As stated in Blobner's paper, there was one case each of hereditary optic atrophy, syphilitic congenital choroiditis, atrophy of the optic nerve after polyneuritis from sulfide of hydrogen, vascular lesions of the retina, and two cases of tabetic optic atrophy. Löwenstein's trial cases were not entirely homogeneous: he chose 11 cases of tabetic optic atrophy and retinitis pigmentosa. Afterwards he reported again on six cases, among them also a case of peripheral choroiditis and congenital lues. In this latter case Löwenstein was able to achieve a decided improvement. Before the sympathectomy the 35-year-old patient saw O.D., fingers at 3 m.; O.S., fingers at 5 m.; after the operation the vision improved up to O.D. 6/60, O.S. 6/24.

The cases of retinitis pigmentosa did not take so favorable a course. Except in one case, in which the acuity of vision in one eye improved from the ability to count fingers at 1½ m. to counting them at 3 m., Löwenstein could not point to

any case that showed improvement in vision or in the field of vision. In his opinion, however, the process came to a standstill. In one case, complicated by a cortical cataract, the condition became considerably worse. Löwenstein himself is of the opinion that here a causal connection cannot be excluded. By way of restriction it must be added that Löwenstein's cases were at the same time subjected to treatment with drugs. Thus all patients had instillations of pilocarpine, injections of strychnine-phosphorus, and a pressure-increasing diet. All patients with retinal pigmentation were given menformon; all with lues were treated with mercury or bismuth. Only the one patient mentioned previously, who had choroiditis with congenital lues, apparently was left without medication. Löwenstein thinks on the whole that he should publicize the good effects of sympathectomy in the diseases studied by him. The clinic Kubik (Blobner's paper) investigated the effect of sympathectomy in five cases each of tabetic optic atrophy and of typical retinitis pigmentosa, and in one case of choroiditis with congenital syphilis. Blobner came to the conclusion that this kind of therapy had to be abandoned, as "an improvement was never achieved, not even a transitory one."

How can these contradictions among scholars of reputation be explained? Blobner's paper ends without voicing an opinion on this question. We must rigidly observe a primary principle that equals can be compared only with equals, which in our case means similar procedures of operation upon like conditions in the patients. It would seem that Magitôt and Löwenstein as well as Kubik's clinic all had their patients operated upon after the method of Leriche-Doppler; mainly, the adventitia of the Aa. carotis communis and interna was split and a piece, 4 to 5 cm. wide, was removed and afterwards touched with isophenol. The operative conditions, therefore, were entirely the same; the difference lay with the sort of patients. The general results obtained by the three authors, Magitôt, Löwenstein, and Blobner, were simply compared with one another, under the tacit presupposition that all the conditions studied were based on the same cause; namely, on the contraction of the retinal arteries. Though this supposition may be roughly correct, it cannot be disputed that the therapeutic effect of sympathectomy must be far more favorable in vascular spasm than in an atherosclerotic affection of a vessel with morphological changes. If, however, the syphilitic cases are completely separated from the syndromes of retinitis pigmentosa in the trial cases of both Löwenstein and Blobner, it appears that the cases of syphilis generally reacted far more favorably to sympathectomy than did the pigmentary degenerations. Löwenstein achieved the best result in his case of choroiditis with congenital syphilis and thus absolutely confirmed the results of Magitôt.

In 1930, sympathectomy in cases of retinitis pigmentosa was for the first time recommended by Royle, further favorable results were reported by him in 1932 and were confirmed by a number of other authors; sometimes, however, disputed (Takate, Gifford MacKenzie, MacDonald). Royle himself stresses the fact that the early cases gave the best results. If Löwenstein thinks to have brought the morbid process to a standstill with the aid of sympathectomy it remains an open question whether this favorable influence is to be ascribed to sympathectomy or to the internal therapy; for at the last congress in Cairo Wibaut reported on an extension of the field of vision in cases of retinitis pigmentosa after treatment with menformon alone, a success that Löwenstein did not obtain in his trial series. An

improvement of central vision, on the other hand, Wibaut did not see, but Löwenstein did see it in one eye. Important are the reports of Nižetič, Spiridonovic, and Bukorov on three improved cases of retinitis pigmentosa which were sympathectomized on one or both sides and at the same time treated with pilocarpine or by cyclodialysis to reduce the pressure. Summing up all their experiences, these authors come to the following conclusion: "But in the cases in which we did not practice reduction of pressure there was no improvement, or an improvement in the beginning was later on followed by deterioration."

The results of Blobner's trial series give an unequivocal answer to this complex of questions. In these cases reduction of pressure was not attempted either internally or surgically. Judging from the anamnesis, they were decidedly advanced cases. The course of the disease was decidedly disastrous. A deterioration in the field of vision which, without treatment, generally takes place in the course of several years, sometimes occurred within a few months after sympathectomy Blobner's pessimism seems to be more than justified; the reader is forced to regard sympathectomy as the injuring, directly aggravating agent.

To recapitulate: (1) Royle was successful with sympathectomy in the less advanced cases. (2) Löwenstein reports a standstill of the process after sympathectomy if at the same time he administered menformon, instillations of pilocarpine, injections of strychninphosphorus, and pressure-increasing nutrition. (3) Wibaut saw success from the use of menformon. (4) Nižetič and his collaborators were successful with sympathectomy only when at the same time they gave internal and surgical pressure-lowering therapy. (5) Blobner found decided deterioration in patients who did not receive additional treatment.

Drawing our conclusions from these facts we find that in reality there are no contradictions. Whilst comparatively recent cases of retinitis pigmentosa are favorably influenced by sympathectomy (Royle), advanced cases in which serious morphological alterations in the vessels have presumably taken place react with decided deterioration (Blobner). These facts exactly correspond to the above theoretical considerations. Furthermore it was found that retinitis pigmentosa responds to menformon (Wibaut). Thus, also Löwenstein's results can be accounted for; his relatively favorable results with the use of sympathectomy, simultaneous doses of menformon, and additional internal therapy, though inferior to those of Wibaut, are far from the bad results Blobner obtained with sympathectomy alone. It is a logical conclusion that only the simultaneous internal therapy saved Löwenstein from the disastrous issue of Blobner's cases. His relative success and also Nižetič's results in retinitis pigmentosa are to be ascribed solely to the supplementary pressure-reducing therapy.

II. If we thus consider sympathectomy to be one of the aggravating principles or the principle itself, we contend that the condition resulting from sympathectomy (method of Leriche-Doppler) directly or indirectly increases the causal factor of retinitis pigmentosa. Let us analyze what occurs in sympathectomy by the Leriche-Doppler method: The main objective of this surgical interference is to seize and eliminate as thoroughly as possible the vasomotor fibers at the superior cervical ganglion passing to the retinal vessels. We have, therefore,

Effect 1. The elimination of the vasomotors of the upper cervical ganglion. According to the therapeutic postulate, this should be the sole desirable effect.

But there is still another, though unintentional effect. The site of the operative interference at a spot with many different and important functions—namely, the end of the common carotid and the beginning of the internal carotid, the carotid bulb—must draw the carotid-sinus reflexes with all their activities into the complex of the problem. According to the reports at hand, the carotid-sinus reflexes were not at all considered in the operation. In no case was there a hint of special regard for the sinus nerve. Therefore we must assume that by thoroughly peeling off the adventitia just at the point where the sinus nerve arises (see fig. 1) this nerve, was of necessity torn off, or at least severely impaired in its efficiency. Since it is proved that the sinus nerve is the only conducting path of the carotid-sinus reflexes, we have

Effect 2. Elimination of the carotid-sinus reflexes. These questions have already been touched upon by Blobner and lately in a paper by Nižetič, but were not followed to their ultimate conclusions.

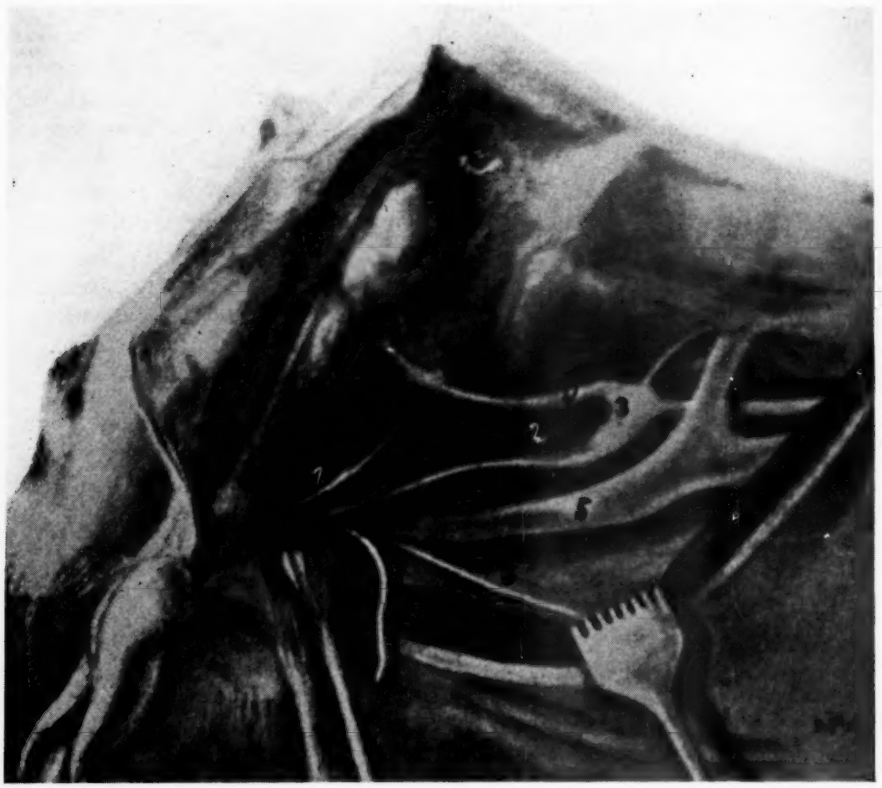

Fig. 1 (Hering). Showing the origin of the sinus nerve in man. 1, N. glossopharyngeus. 2, Sinus nerve. 3, Sinus caroticus. 4, Carotis externa. 5, Vena jugularis. 6, N. accessorius. 7, N. hypoglossus. Taken from Hering's "Die Karotis-Sinus-Reflexe auf Herz und Gefässe," 1927, figure 21.

Effect 1. 1. For a long time it has been a controversial question whether the vessels of the brain and the retina have their own vasomotors, but to me this point seems rather irrelevant, for a passive dilatation should produce the same therapeutic effect as an active one. While Bayliss, Hill, and MacLeod consider that the

entire circulation of the brain, and therefore also the supply of the retina, is passively dependent on the fluctuations of the general circulation, most of the authors today, among them Hürthle, Biedl, Reiner, Jensen, O. Müller, Siebeck, and Richter, believe in the existence of proper vasomotors in the brain, and, as we conclude, also in the retinal vessels, although Müller and Stöhr showed that the very smallest arteries of the brain parenchyma are without nerve supply. The indispensable condition for the therapeutic effect through sympathectomy in retinitis pigmentosa or, in general, in affections of the retina due to contraction of the vessels, is the integrity of the wall of the vessel, which alone guarantees its full elasticity and the possibility of enlarging its lumen. This question will be dealt with extensively farther on.

2. Until recently it was assumed that all vasomotor fibers to the brain and the organs of sense belonging to it are relayed in the upper cervical ganglion; in other words, that their preganglionic fibers end there. This supposition led to the unfortunate attempt to influence quite different diseases by means of sympathectomy, but today it is an established fact that all vasomotors to the vertebral plexus are given off in the inferior cervical ganglion, where they are relayed and thus entirely cut off from the sphere of influence of the superior cervical ganglion. They pass from the inferior cervical ganglion by way of the vertebral plexus, vertebral arteries, basilar arteries, and posterior cerebral arteries to the circle of Willis. There they are connected with the vasoconstrictor fibers of the anterior and medial cerebral arteries the fibers of which arise from the upper cervical ganglion by way of the carotid plexus and the internal carotid arteries. In addition, there is also a third group of vasoconstrictor fibers which in their entirety supply the external ear, half of the face, the cavity of the tympanum, conjunctiva, iris, choroid, and retina. They pass the ciliary ganglion and intermingle with the vasomotors of the first branch of the fifth nerve and the cavernous plexus. Whether they are relayed in the ciliary ganglion as a whole or in part is not yet established so far as I know. At any rate, the fact is interesting that the inner ear, the retina, and choroid are supplied by the same set of vasomotor fibers, an important argument which, in the literature, so far as I can see, has never been expressly pointed out in this connection. This fact brings us nearer to understanding the hitherto unexplained frequent coincidence of retinitis pigmentosa and deaf-muteness in the same individual or separately in members of the same family. Hereby the results of Löwenstein and other authors are also confirmed. According to Löwenstein's reports, several of his patients had spontaneously stated that their troublesome ear noises entirely ceased after sympathectomy.

3. The authors who by sympathectomy wished to achieve a vasodilator effect on the retinal vessels could expect success only in so far as (a) their supposition conforms to reality that the vasoconstrictor principle is to be found in an increased stimulation of the sympathetic system itself, and as already pointed out, (b) the walls of the vessels had kept their elasticity. But, owing to the experimental studies of Sidney Ringer and Jacqes Loeb and to the well-founded theoretical discussions of S. G. Zondek and Kraus, we know today that there are stimulating effects leading to an increased sympathetic activity which take their origin from a point beyond the site of nervous action; namely, at a site termed by Zondek and Kraus "das vegetative Betriebsstück," the autonomous activity center of the cell, or still farther off. Furthermore,

it is known that after elimination of the nervous factor the denervated heart and the denervated pupil become a highly sensitive recording mechanism for ions and endogenous pharmaca which have their point of action beyond the terminal nerve parts. In consequence, we have the sometimes apparently paradoxical reactions, such as mydriasis after removal of the upper cervical ganglion and miosis after elimination of the ciliary ganglion. Specially applied to our problem, the vessels of the retina and choroid represent the executive organ in which, after sympathectomy, the autonomous activity center of the cell becomes hypersensitive to stimuli whose working point lies beyond the terminal part of the nerve. By examining the vision and the field of vision the effect can be exactly registered. Therefore, if a vasoconstrictor principle could be found that has its working point at the autonomous activity center of the cell or beyond it, all results could be logically explained from this point of view. It would be plausible that sympathectomy would necessarily bring about a rapid deterioration of vision in Blobner's cases and that there could be no question of vasodilatation.

4. In looking for these still unknown forces in retinitis pigmentosa, we find no clues in the literature, for the problem has never been approached from this aspect. As to endogenous adrenalin, the very transitory effect of which is well known, we presume that its working point coincides with that of the nerve. Calcium ion, which produces the same effect as the sympathetic nerve, has indeed a peripheral working point, but I have never succeeded in proving an increased proportion of calcium in the blood of patients suffering from retinitis pigmentosa. However, in my investigations on this point I obtained results which showed a connection between retinitis pigmentosa and the cholesterin metabolism. In very recent cases the proportion of the blood cholesterin was at the upper limit of the norm, from 180 to 200 mg. percent, whereas all of the advanced cases showed increases occasionally up to astonishingly high proportions from 360 to 380 mg. percent. The function of the cholesterin and its active and passive relations to the general metabolism are in no way established; on the contrary, we still are at the beginning of our investigations. We do not know whether cholesterin has a vasoconstrictor effect and a peripheral working point. The only fact not controversial about its mode of action is that in cholesterinemia—perhaps only under certain circumstances—secondary morphological changes appear in the vessel wall that have much in common with the alterations in atherosclerosis, and at first were confused with it. On the other hand, my studies in this direction are still insufficient and there is still hope for the eventual discovery of another factor that will meet both demands; namely a lumen-constricting principle and peripheral working point.

Effect 2. 1. Turning now to the second effect of sympathectomy (Leriche-Doppler)—namely, the elimination of the carotid-sinus reflexes—speaking exactly, there are two entirely distinct reflexes: the vessel reflex and the heart reflex. The effect of the vessel reflex consists in the reduction of the blood pressure, which is not limited to the regional field of supply but, as Hering proved, is a general symptom. Hering in his fundamental experiments on the carotid-sinus reflexes, which he discovered, took his blood-pressure tracings mostly from the femoral artery. The heart reflex shows itself by a reduction in the number of the heart beats. The reflexes, when physiologic, originate from the inner wall of the vessels within a very limited area,

at the end of the common carotid artery and the beginning of the internal carotid, the carotid bulb. Hering proved that the nerve which he called the sinus nerve is the only conductor of the carotid-sinus reflexes; its elimination abolishes the reflexes. The sinus nerve arises from the bifurcation of the carotid. The course of its fibers is centripetal but has not yet been studied in detail. According to Hering's definition, the carotid-sinus reflexes, in common with the aortic reflexes, regulate the blood pressure "by checking its rise" and thus "promote the blood stream by rendering more difficult the contraction of peripheral vascular areas by way of reflex." The carotid-sinus reflexes, therefore, become the direct antagonist of all vasoconstrictor forces. It is evident that in such cases as retinitis pigmentosa in which vasoconstrictor processes play a dominant part, elimination of the carotid-sinus reflexes must be associated with the most serious consequences, inasmuch as the vasoconstrictor principles can then exert their damaging influence without hindrance.

2. It is erroneous to consider the carotid-sinus reflexes and the aortic reflexes as true reflexes. A reflex, whether direct or indirect, is the expression of a direct transfer of an afferent stimulus to the motor neuron, thus avoiding the higher central centers, specially the sphere of consciousness. Hering in his definition does not touch upon this point, but in the proper vascular reflexes presupposes a coöperation with important autonomic centers of the brain. Although the processes in the carotid-sinus reflexes and also in the aortic reflex take place outside the sphere of consciousness, they cannot dispense with autonomic centers in the brain. Therefore I propose to call these special reflexes of the vessels, conditioned reflexes.

3. I do not want to pass over in silence the fact that directly at the bifurcation of the carotid is the so-called carotid gland, the paraganglion intercaroticum. Hering energetically rejects Drüner's opinion that this structure could play an active part in provoking the carotid-sinus reflexes. I also think it wrong to ascribe a purely nervous function to an organ with endocrinous function—though it may have the same embryonal origin as the sympathetic system—but to my mind it is possible that under pathologic conditions the swelling of the gland and its subsequent diminution in size give rise to the provoking or weakening of the carotid-sinus reflexes, respectively.

In our considerations we started from the fact that, according to Blobner's publications on the therapeutic effect of sympathectomy (method of Leriche-Doppler), cases of syphilis reacted differently from those of retinitis pigmentosa. Except case 11, in which there were complications of a technical nature, the cases of syphilis did not appear to be influenced by sympathectomy, the clinical syndrome and its course being the usual ones. The cases of retinitis pigmentosa, however, reacted differently to sympathectomy: there was a deterioration of the function to an extent and with a speed hardly ever observed in untreated cases. Here sympathectomy must be considered a directly harmful agent. Blobner himself, when giving his opinion, had not classified his cases etiologically, hence he missed this fact. He merely reported that he had never seen the slightest improvement. Syphilis and retinitis pigmentosa, therefore, according to their unequivocal reactions to the same principle, must have totally different morbific factors, their vasoconstriction must be of a quite different nature. But if sympathectomy (method of Leriche-Doppler) could directly aggravate the symptoms of retinitis pigmentosa without producing

any other but the usual symptoms, this is proof that the harmful factor of retinitis pigmentosa is active on the same lines as sympathectomy itself. Above we thoroughly discussed both effects of the sympathectomy (Leriche-Doppler) and found two arguments that account for the aggravating principle in retinitis pigmentosa; namely, the sensitization of the autonomous activity center of the cell to vasoconstrictor principles with a working point peripheral to the nerve ending, and the elimination of the carotid-sinus reflexes, the antagonists of all vasoconstrictor stimuli. It is impossible to ascertain if both effects are equally responsible for the result. In order to clear up this point also, the operation should be performed by a different method that allows keeping the carotid-sinus reflex to its full efficiency.

At any rate our considerations give us the right to regard the vasoconstrictor principle as the etiologic morbific factor. Further researches will decide whether cholesterinemia, which I regularly observed, has a causal connection with the vascular phenomena. So far as I know, in this connection the fact has never been mentioned that, as to their vasomotors, both the cavity of the tympanum and the inner eye are supplied by the same unit. In retinitis pigmentosa we found the vasoconstrictor principle to be the causal factor; hence we may certainly assume that if retinitis pigmentosa and deaf-muteness are found together in the same individual or in the same family, the latter disease is attributable to the same cause.

III. Since our considerations center in the vasomotors it is imperative to enter into the problems of the central nervous system. Today it is the general opinion that the brain and therefore also the organs of sense are governed by a proper vasomotor center working independently from that in the medulla oblongata. In the literature at my disposal I could not find an exact reference as to the site of this center. Some authors quite generally locate it in the hemispheres of the brain, others point to the diencephalon as a more circumscript localization. Owing to the fundamental experiments of Karplus and Kreidl, we know today that to faradic stimulation of a limited area on the lateral side of the infundibulum the animal organism reacts with a series of phenomena on the part of the sympathetic nerve, in the positive or negative phase, as: general increase of pressure, sweating of all four feet, secretion of the lacrimal and mucous glands, mydriasis ad maximum, and so on; contractions of the urinary bladder were also observed. Thus we may look upon this spot of the hypothalamus as a decided center of sympathetic impulses that can be subdivided into motor, secretory, and vasomotor effects. Accordingly, it is uncertain whether it is more correct to regard the secretory fibers as also vasomotor fibers under the influence of which there is indirectly caused a secretion of the specific gland cells. On the other hand, as a result of the excellent researches of Krehl, Isenschmidt, and Schnitzler, the ventral gray matter of the third ventricular cavity was found to be the center of temperature regulation. The means of regulation applied by this center are again general sympathetic sensations. If the body is in danger of cooling down, the heat regulating center cares for increased production of heat, at the same time reducing the loss of heat. The reactions are: contraction of the skin vessels, increase of oxidation in the liver and the muscles by augmented pouring out of adrenalin, intensified activity of the heart, and increase of blood pressure. Contrariwise, if the body is becoming overheated, the regulating mechanism responds by dilatation of the skin vessels, secretion of sweat, reduction of the blood pressure, and so forth. Again we find the same vasomotor factors that, as has been

proved, are dominated by the center discovered by Karplus and Kreidl in the hypothalamus. Therefore, the two centers are either to be declared identical or at least a functional unit by coöperation, and the center of Karplus-Kreidl a part of the heat-regulating mechanism. At any rate the sympathetic center of Karplus-Kreidl is dependent upon the heat-regulating mechanism and is its executive factor.

It is well known—and Lauber also mentioned the fact at the last Ophthalmological Congress at Cairo—that retinitis pigmentosa is associated with low blood pressure. Add to this the fact that in my cases the regularly taken temperatures were subnormal; the lowest temperature I found in advanced typical cases. A female patient complained also about a very troublesome strangury the cause of which could not be made out. Furthermore, it was striking that there were extremely small differences between the temperature before breakfast and the evening temperature; to my mind these phenomena are the manifestations of a reduced specific dynamic effect. Unfortunately, due to extraneous circumstances, this conjecture could not in all cases be proved by examination of the basal metabolism.

Thus, the heat-regulating center in retinis pigmentosa acts just as if it were informed about an increase in the body temperature; it reacts by reducing the blood pressure and by lowering the temperature. During fever, according to the ingenious definition of Liebermeister-Filehne, the heat-regulating mechanism is working at a higher level than at a period when there is no infection. In retinis pigmentosa—and perhaps also in other diseases—the heat regulator seems, on the other hand, to be adjusted at a lower level. This level appears steadily to descend as the disease advances. Thus there must be a constant irritation that produces a continuous counteraction in the heat-regulating center. Barbour was able to prove that the thermal central mechanism at the floor of the third ventricle responds not only by reflex ("vascular proper reflex" in the sense of Hering; the author) but also directly on the fluctuations of the blood temperature. Furthermore, it is proved that contamination of the blood, such as by colloidal particles, dissolved or suspended, dissimilitive products of the metabolism, whether organic or anorganic, can bring about the same reactions in the heat-regulating center as does the raised temperature of the blood. Cholesterin, which, according to Porges and Neubauer, is very radiosensitive and acts like a typical suspensoid, therefore, when in the blood in great quantity, might be capable of influencing the heat regulator and thus indirectly be responsible for the reduction of the blood pressure and the lowering of the body heat.

Although, as is well known, large quantities of cholesterin are ingested with the food, science generally follows the view of the French school that the body itself forms cholesterin. Cholesterin has hitherto always been a stepchild of research, but after its production by the body itself was discovered, it grew extraordinarily in interest and importance. The French writers suggest the cortex of the adrenals as the place where it is produced. The function of cholesterin is as yet entirely unknown. Perhaps the above discussions will contribute a new direction to research. It is quite possible that to endogenous cholesterin must be ascribed a hormonal effect; if so, we may hope some day to find, among the many hormones of the hypophysis, a principle activating cholesterin. Special science and research will bring it to light.

1. Numerous are the cases in which retinitis pigmentosa is associated with other syndromes. It is never a fortuitous coincidence, but there are always the

same combinations. The most frequent combination—according to Bell in about 10 percent of all cases—is the association with deaf-muteness or only deafness, respectively. This ear complaint is hardly ever congenital but frequently precedes retinitis pigmentosa. It was stated above that this affection of the inner ear must be looked upon as a consequence of the same vasomotor disorder that brings about the symptoms of retinitis pigmentosa. Furthermore, retinitis pigmentosa is frequently found associated with epilepsy, acrocyanosis, and Raynaud's gangrene, in all of which there is an interference with the vasomotor regulation of (in each case different) vascular areas. In this direction also our newly acquired knowledge obtains decided support.

2. Retinitis pigmentosa is preferably combined with a second group of syndromes, all of which show symptoms connected with the pituitary gland; Hirschsprung's disease (megacolon), poly- or syndactylia, the so-called Biedl syndrome, and cachexia hypophysaria. The congenital malformations are proof that the disease had already become manifest in intrauterine life, and the fact that the symptoms usually appear only in extrauterine life does not contradict the opinion that in these cases also a predisposition to the syndrome was established in the embryonal stage.

3. The symptoms of the pituitary gland in themselves are by no means proof of a diseased pituitary gland. It is interesting in this connection to dwell somewhat on the relation between the pituitary gland and the diencephalon. Whereas the stalk and the pars neuralis were considered to be processes of the brain and thought to be free from ganglion cells and nerve fibers, today, thanks to researches in this direction by Pines, Collin, Greving, and Stengel, its has been accepted as proved that there are two sets of nerve bundles from the diencephalon to the pituitary gland, one of which arises from the nucleus supraopticus and can be traced up to the tuber cinereum; the second bundle arises directly at the third ventricle from the nucleus paraventricularis. So far as I know, there is as yet no proof of the function of these two tracts, but the opinion is frequently expressed that these nerve fibers influence the hormone production of the gland. Therefore an obstacle at the floor of the third ventricle might injure the nerve fibers in their course to the pituitary gland and interfere with its hormone production without the gland itself necessarily being diseased.

As is well known, the pituitary gland does not empty its products directly into the blood. The investigations by Hering, Collin, and Raab have demonstrated that in the higher mammals colloidal drops pass upwards into the perivascular areas of the lymph channels or into the crevices between the glial tissue up to the tuber cinereum whence they flow directly into the third ventricle and in this roundabout way are brought into the blood vessels. Although it is not quite certain that these colloidal drops are the secretion of the hypophysis cerebri, at any rate the opinion prevails that the path followed by these colloidal masses at the same time represents the course by which the secretion reaches the blood. An obstacle at the floor of the third ventricle, therefore, should without difficulty be able to interrupt the flow of secretion from the gland into the fluid of the ventricle. The disturbances resulting therefrom on the part of the hypophysis thus would be only of a secondary nature. Add to this the fact that X-ray studies of the sella turcica in retinitis pigmentosa show normal conditions in all cases.

Our considerations and investigations therefore compel us definitely to give up antiquated views. According to the latest state of researches, typical retinitis pigmentosa must be considered a manifesta-

tion of disturbed vasomotor action. It is an effect at a distance. The site of the activating factor is to be located at the area of the hypothalamus, at the floor of the third ventricle.

Summary

1. The evaluation of the papers of Royle, Magitôt, Löwenstein, Blobner, as well as Nižetič and collaborators, in their entirety led to the conclusion that in typical retinitis pigmentosa the disturbed vasomotor regulation is the causal damaging factor.

2. Retinitis pigmentosa is accompanied by two general symptoms: (a) hypotony which, though often mentioned, was never explained as far as I know; (b) lowering of the temperature which is described here for the first time. The remarkably low daily peak of the temperature curve is here considered as an expression of the reduced specific dynamic effect.

3. The hypothalamus is pointed out as the site of the disturbance. All general symptoms such as disturbed vasomotor regulation, hypotony, and fall of temperature are phenomena of the sympathetic nerve arising from the center of Karplus-Kreidl on the lateral side of the infundibulum. The vasomotor center in the diencephalon, frequently mentioned in the literature, therefore, is not an independent center but only the representative of one of the different sympathetic factors of the center of Karplus-Kreidl. It obtains its impulses from the temperature-regulating mechanism and transmits them to its motor neurone. The heat-regulating central mechanism, on its part, is controlled by the special vascular reflexes; namely, the paired carotid-sinus reflexes and the aortic reflexes. It is stressed that these vascular reflexes are not genuine reflexes. Though the processes take place without the sphere of consciousness they cannot come about without the active collaboration of important centers of the central nervous system. The center of Karplus-Kreidl and the temperature-regulating mechanism in the central gray matter of the third ventricle form a physiological unit of action. They represent the sensory and motor components of the same reflex arc. For want of a better term the special vascular reflexes are herein called "conditioned reflexes."

4. The heat-regulating mechanism responds not only by reflex but also directly to a rise of temperature or contamination of the blood by colloidally dissolved or suspended substances of an organic or anorganic nature.

5. Cholesterinemia is for the first time reported here as a constant finding in typical retinitis pigmentosa. It is assumed that the cholesterin, being a suspensoid, influences the regulation of the temperature directly through the blood. This supposition is supported by the fact that, with advancing disease, the cholesterinemia increases and the body temperature falls.

6. The special place of action for the cholesterin is the wall of the vessel. The specific dynamic working point must be peripheral to the nervous terminal part, namely, at the autonomous activity center of the cell, as B. Zondek and Kraus termed it, or still farther towards the cell. Its action produces a vasoconstriction supporting the causal spastic-nervous principle in its effect and lending it a permanent form.

7. The fact that typical retinitis pigmentosa is combined with syndromes the origin of which is also based upon a disturbed vasomotor action, confirms, from a general viewpoint also, the results here discussed in detail for the first time. All eventual disturbances on the part of the pituitary gland are considered effects at a distance and their significance parallels that of the syndrome of retinitis pigmentosa.

For bibliography see Part II, which will be published in an early issue.

HEMANGIOMA OF THE ORBIT

Report of six cases with clinical and anatomic findings*

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Etiology

Not much is known concerning the etiology of orbital hemangiomas. Some authors, including Birch-Hirschfeld,[1] Chevallereau and Chaillous,[2] Fialkowski,[3] Török,[4] and Lagrange,[5] believe them to be of congenital origin. Di Marzio[6] stated that in three of his four cases he found in the systemic blood as well as in that of the hemangiomas some hematoblasts, promyelocytes, and myelocytes, all of which he considered the exciting agents. For this reason he advised for diagnostic purposes an exploratory puncture into the growth. It is possible that orbital hemagiomas really begin early in life but grow so slowly that they are not noticed at all until after a varying interval of time. In any case, the tumor is slow in growing and usually requires several years before the exophthalmos is marked enough to make the patient seek surgical relief.

Clinical and anatomic findings

The site of predilection for Schindler's[7] cases was the upper nasal part of the orbit and the upper eyelid. The tumor was not sharply demarcated, but more commonly lay behind the tarsoörbital fascia between the periosteum and the muscle cone, sometimes extending anteriorly into the eyelid and posteriorly penetrating deeply into the orbit.

It is necessary in any study of hemangiomas of the orbit to consult at length Birch-Hirschfeld,[1] the greatest of the authorities on diseases of the orbit. When not otherwise stated in this article practically all quotations have been taken from this distinguished author.

According to Di Marzio,[6] hemangiomas are considered benign tumors, for they do not give rise to metastases nor to local recurrences after removal. They do not affect the orbital bones except by pressure. The tumors are usually well circumscribed. Hemangiomas of the orbit occur as frequently as dermoid cysts of the orbit. Hemangiomas are, however, more frequently found in the eyelids than in the orbit.

Virchow[1] (quoted by Birch-Hirschfeld), writing of the characteristics of angiomas, distinguished between angioma simplex and angioma cavernosum. The first consists of broadened and elongated capillaries, resembling the so-called telangiectatic variety, usually without a capsule. It occurs very rarely in the orbit, while it has been observed frequently in the subcutaneous tissue generally, as well as in the eyelids. The cavernous hemangioma possesses a framework of trabecular connective tissue, between which are frequently found cavities filled with blood. The cavities are lined with smooth endothelium and are connected with broad veins. In the connective tissue partitions arteries and capillaries are observed. The anatomical structure corresponds with the corpus cavernosum of the penis.

The hemangioma of the orbit is usually well circumscribed, possesses a capsule, and lies in close proximity with the extraocular eye muscles. In the early stages, it is difficult to differentiate it clincally from other growths. According to Berlin,[8] a simple angioma of the orbit is rarely

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found singly. Most frequently it occurs with an angioma of the eyelid or adjacent skin. Occasionally it is regarded as a lipomatous angioma.

According to Birch-Hirschfeld, out of 83 cases reported by Lagrange,[9] only 63 could be regarded with certainty as angiomas of the orbit. It is uncertain how one can clinically differentiate orbital angiomas. Should one, for example, consider cases with a distinct pulsation of the tumor an angioma or a pulsating exophthalmus? Birch-Hirschfeld believes pulsation in the case of angiomas to be very unusual. Accordingly, the supposition may be correct that we are dealing with an aneurysm of the orbit, either arterial or venous, and arising either following rupture of the carotid artery into the cavernous sinus, or due to an aneurysm of the ophthalmic artery. It is still more difficult to differentiate between angioma and varicocele of the orbit. It must be admitted that many cases of angioma of the orbit present the symptoms of intermittent exophthalmos, and that in the incipient stages of angioma it can be difficult or impossible to draw a distinction. An operation does not necessarily lead to a clarification of the diagnosis since anatomically the angioma can exactly resemble a varicocele. Upon the basis of Birch-Hirschfeld's cases, it can safely be assumed that both the simple and the cavernous angioma could present an intermittent fluctuation, the simple angioma perhaps more frequently than the cavernous.

Of 132 cases reported by Birch-Hirschfeld, 114 were diagnosed accurately anatomically as to type; not less than 98 of these were cavernous angiomas and 16 were simple angiomas. Of these 132 cases, 59 were in males and 73 were in females. The time at which the individuals first sought medical advice after the exophthalmos was perceived varied from 9 to 16 years. Frequently, the growth was attributed to trauma. Spontaneous remissions have been observed.

According to W. P. Ling[10] the tumor can exert harmful influences upon the eyeball. By its pressure upon the optic nerve it can produce atrophy or choked disc. For the same reason the veins in the fundus may show an overfilling. Finally, because of the mechanical displacement of the eyeball forward, produced by the tumor, a condition known as keratitis e lagophthalmo may develop which may lead to an ultimate destruction of the eye. Ling thinks hemangioma of the orbit is by no means so rare a tumor as it appears. It is the most common type of neoplasm we have in the orbit, apart from the cylindroma.

Diagnosis

The diagnosis is essentially easy when the tumor has pushed anteriorly under the skin of the eyelids and is visible as a bluish or bluish-red discoloration. The slow, mostly painless growth of the tumor, the preference shown for its development in the muscle cone, the occurrences of enlargement and diminution of the exophthalmos, the elasticity of the tumor and its compressibility, together with the simultaneous presence of angiomas in other parts of the body, lend weight to the diagnosis of angioma of the orbit.

Prognosis

The prognosis of orbital angiomas as far as life and usefulness of the eye are concerned is favorable. No cases have been reported in the literature of metastases from an hemangioma of the orbit. The growth is generally considered as benign.

Treatment

The treatment should be surgical whenever possible. In cases in which the eyeball is still intact, a Krönlein operation

would give the best results both for cosmetic purposes and the removal of the tumor. For local treatment, if the tumor is not too large, 0.25 mc. gold radon seeds placed 1 cm. apart in the tissues have often resulted in its obliteration. Electrocoagulation may be used in extensive orbital hemangiomas.

Case reports

Six cases of hemangioma of the orbit are herewith described, both as to clinical findings and microscopic pathology.

Case 1. A 63-year-old white male was admitted to Barnes Hospital on June 21, 1921, with the complaint of a "bulging of his right eye" of some 25-years' duration.

The trouble in his right eye had begun 25 years previously with a diplopia. Soon after this, a swelling appeared across the lower margin of the right orbit. Ten years after the onset, the patient noticed that he could not see objects with his right eye in the direct line of vision but that peripherally his vision was good. This impairment of vision gradually increased until all sight was completely gone in his right eye. Along with this diminution in vision, the right eye gradually became more prominent. The patient stated he had never had any pain nor discomfort except for some swelling of the bulbar conjunctiva for which he used hot packs. He also stated that he had consulted a general physician who had treated him for syphilis.

The family history was essentially negative except that one sister had died of tuberculosis at the age of 38 years; one brother had had a lipoma excised from his arm.

The patient himself had always been well except for inflammatory rheumatism at the age of 17 years.

Physical Findings: The only physical changes other than those of the eyes were a condyloma on the right anterior axillary line and a rounded bony prominence on the right side of the frontal bone just to the right of the midline and 3½ inches above the glabella. This bony prominence was an inch in diameter and projected upward about one quarter of an inch from the skull.

The right upper and lower eyelids were swollen. There was an exophthalmos of the right eye of about three quarters of and inch. Movements of the right eye were somewhat limited. Two or three rather nodular, firm masses, probably chalazia, could be palpated in the right upper eyelid. There was no palpable pulsation in the right eye nor did it show any opacity by transillumination.

Ophthalmoscopic Findings: A distinct pallor of the right optic papilla with indistinct margins and some tortuosity of the retinal veins was observed. The retina itself was negative. The left eye showed no changes from the normal.

Laboratory Findings: Negative.

Operation: On June 23, 1921, Dr. V. P. Blair performed a modified Krönlein operation. An incision was made around the outer border of the right orbit extending down to the bone. The incision was carried backwards from the upper border to the lower border of the middle of the zygoma. The orbit was opened, revealing a solid tumor which was found to fill the entire orbit and which was firmly attached to the back of the eyeball. The tumor was dissected free from the eyeball, taking some of the ocular muscles with it. A part of the tumor was left in the extreme apex of the orbit.

A postoperative swelling and softness of the right lower eyelid necessitated a plastic operation on the lid on January 12, 1922.

Microscopic Pathology: The excised tissue showed remnants of a capsule in places. At several points thick septa of collagenous connective tissue extended

from the surface into the interior of the growth, and frequently divided into thinner connective-tissue septa (fig. 1). The latter often lay between masses of cells forming the growth. Usually within the connective-tissue septa lay numerous flattened small blood vessels very irregularly arranged. Practically all of these blood vessels had connective tissue in their walls so that they were not capillaries. In one large vessel both the internal and external elastic membranes were present. Only a comparatively few of the larger vessels had a thin muscular coat with an elastic lamina. This elastic lamina was generally internal to the muscle coat but in isolated instances was external or internal and external. The essential cells of the growth were generally arranged in alveolar masses. The cells were compactly arranged and had a fairly large nucleus either round or spindle shaped. The nuclei stained fairly lightly with hematoxylin-eosin. These cells were definitely endothelial.

Diagnosis: Hemangio-endothelioma.

Case 2. A 43-year-old white male, a salesmanager, was admitted to Barnes Hospital as a private patient of Dr. Meyer Wiener on May 24, 1924. The diagnosis was angioma of the left lower eyelid.

His trouble had begun with an insidious onset 3½ years previously, producing a swelling of the left lower eyelid. Six months preceding his admission to the hospital, this swelling of the left lower eyelid was operated on by another physician than Dr. Wiener, and the growth diagnosed as an angioma. Since that operation, it had apparently reappeared and gradually increased in size but was never painful nor inflamed. There was no history of trauma. His family history and his own personal history were without significance.

Physical Findings: Negative except for a small mass in the left lower lid, soft in consistency, and apparently encapsulated.

Laboratory Findings: Negative.

Operation: Under ether anesthesia, a horizontal incision was made the length of the left lower lid in the old operative scar just a little above the inferior mar-

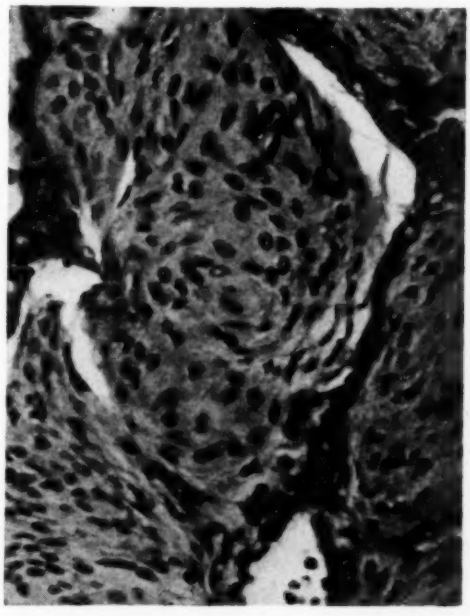


Fig. 1 (Meisenbach). Case 1. Section through small part of hemangioma, showing small blood vessels lying within thin connective-tissue septa. Proliferation of the endothelial lining of the small blood vessels has produced alveolar masses of an endotheliomatous nature. × 375.

gin of the orbit. The subdermal tissues were found matted together from the previous operation. Dr. Wiener was unable to find a distinct growth but did find a thick rope-shaped mass strongly resembling scar tissue, lying under the line of the old incision. This mass was removed and the wound closed with silk sutures. The recovery was uneventful.

Microscopic Findings: The excised tissue showed no capsule. The specimen was essentially composed of numerous blood vessels of greatly varying size, separated

by varying thick strata of connective tissue (fig. 2). The blood vessels were generally thick walled and show greatly varying degrees and often irregularly arranged proliferation of the endothelial lining, of the muscular coat, and of the internal elastic lamina. Arteries and veins

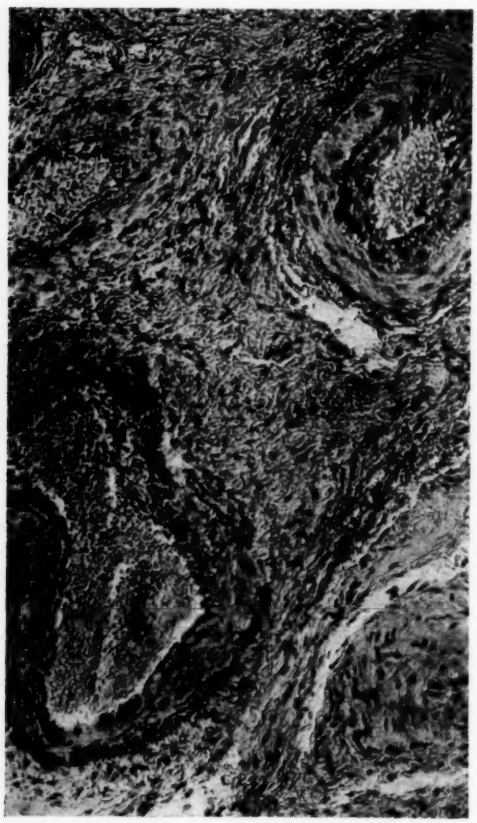


Fig. 2 (Meisenbach). Case 2. Section through small part of hemangioma, showing thick-walled blood vessels separated by thick strata of connective tissue. × 140.

of all sizes were identifiable. True capillaries were rarely encountered.

In a few places, small collections of unstriped or involuntary-muscle fibers lay in various directions from perpendicular to longitudinal with the plane of the section. These collections of smooth-muscle fibers were in places separated by thin layers of connective tissue. The large masses made up of the small collections of unstriped-muscle cells were generally surrounded by orbital fat cells.

The bundles of collagenous fibers between individual blood vessels varied greatly in thickness. This collagenous connective tissue extended in any direction from parallel to perpendicular to the plane of the section. Within this collagenous tissue, elastic tissue occurred very irregularly in short thickened fibers. Usually, these elastic-tissue fibers were situated on the outer surface of the collagenous tissue bundles. Collections of orbital-fat cells were present irregularly and in a small to moderate degree within the growth.

Diagnosis: Fibrohemangioma with thick-walled arteries and veins. Distinct large foci of leiomyoma apparently from the muscle cells of arteries and veins.

Case 3. On September 12, 1927, a 6-months-old white female infant was admitted to the Saint Louis Children's Hospital with the history of a growth of the left upper eyelid present since birth.

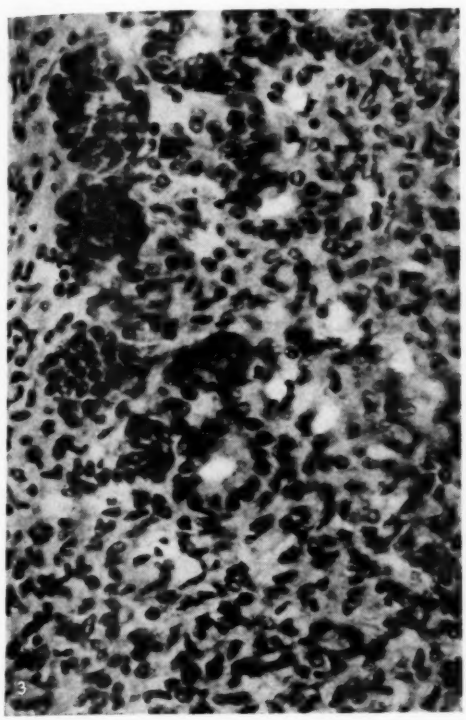
The family history and personal history were negative.

Physical Findings: Negative except for swelling of the left upper eyelid and the adjacent tissues with a purplish discoloration of the skin of the eyelid at its temporal end. The eyeball itself was negative both externally and ophthalmoscopically. The impression at the time was that of a telangiectasis of the left upper eyelid.

Laboratory Findings: Negative.

Operation: On October 7, 1927, Dr. V. P. Blair removed the growth after first applying a spring clamp to the left internal carotid artery through a small neck incision. A curved incision was made under the left upper eyebrow and 10-percent calcium-chloride solution was injected throughout the tumor. The tumor was removed with only a slight loss of blood after carrying the dissection far

back into the orbit. The lacrimal gland was also removed, but none of the extraocular muscles were damaged as far as could be determined. A mercurochrome pack was inserted and the wound was closed. The neck wound was closed with a rubber-dam drain inserted after the clamp was removed from the internal carotid artery. The postoperative course was uneventful and the patient was discharged on October 29, 1927, improved.



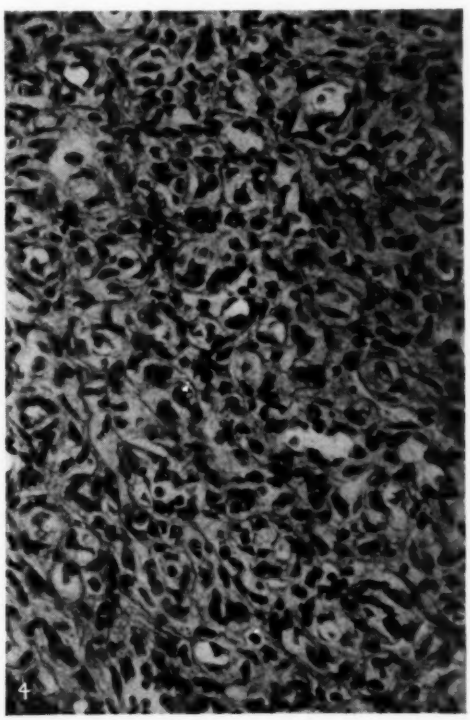


Fig. 3 (Meisenbach). Case 3. Section through small part of simple hemangioma, showing disarranged lacrimal-gland acini surrounded by very small capillaries. × 300.

Fig. 4 (Meisenbach). Case 4. Section through small part of simple hemangioma, showing numerous very small capillaries lying between proliferating endothelial cells. × 375.

Microscopic Pathology: The excised tissue showed no capsule. The growth was composed of many irregularly shaped lobules, separated by thin septa of connective tissue. The specimen was composed of many small dilated capillaries in part containing red blood cells (fig. 3). In some places these lay between normal acini of the lacrimal gland. Only a small amount of connective tissue was present between the capillaries. The interlobular tissue contained in places many large arteries and veins, and in several places many fat cells. Several of the large arteries and veins showed a marked endovasculitis as evidenced by the marked endothelial proliferation. Each lobule of the growth was composed of a mass of closely packed acini, among which were found varying numbers of small capillaries. Between these capillaries were very few if any endothelial cells. Within some of the lobules many fat cells were seen.

Diagnosis: Simple hemangioma of orbit and lacrimal gland.

Case 4. A 3-months-old white female infant was first seen by Dr. Carl Beis-

barth on October 10, 1931, with the history that the parents had noticed at birth a lump in the right upper eyelid. There was no redness, and they had observed that the lump had remained of about the same size.

Family history and personal history were without significance.

Physical Findings: Examination revealed a small tumor, not hard nor tender, lying just above the inner canthus in the right upper eyelid and just under the margin of the orbit. This mass was not connected with the tear sac. Externally, the eye appeared normal and the ophthalmoscopic examination was negative. No exophthalmos was present. The provisional diagnosis was either a dermoid, a meningocele, or a mucocele of the frontal sinus.

On November 21, 1931, the mass was definitely larger with a displacement of the right eye downward and laterally, but apparently no exophthalmos was present. The mass was firm but appeared to fluctuate. X-ray studies taken at this time were inconclusive, although the right orbit appeared larger than the left, but no gross bony defect was demonstrable. The insertion of a hypodermic needle revealed only a small amount of blood-tinged fluid.

Laboratory Findings: Examination of this fluid was negative for blood or pus and a culture from it was also negative.

Operation: On June 24, 1932, an incision was made over the mass, revealing a smooth cyst wall. The dissection was carried backward along the medial wall of the orbit for about two inches and an elongated cystic mass was excised. The postoperative course was uneventful.

The patient was seen subsequently on March 28, 1936, when there was noted a divergent strabismus involving the right eye. Vision O.D. was 1/14 or less and O.S. 6/10 plus, with pictures.

Microscopic Pathology: The excised tissue showed no capsule. The growth was divided into large lobules of irregular size and shape by thick trabeculae of compact connective tissue. In places within the connective-tissue trabeculae were numerous elastic-tissue fibers, many large veins, and a few arteries. From these connective-tissue trabeculae thin strands extended into the large lobules irregularly dividing the essential tissue into still smaller masses. The essential tissue was composed of many small capillaries (fig. 4). In places between the small capillaries, considerable hyperplasia of the lining endothelial cells was present, and the new formation of capillaries could be observed. A small piece of hyaline cartilage surrounded by connective tissue was seen at one side of the growth.

Diagnosis: Simple telangiectatic hemangioma of orbit—new formation of capillaries, hyaline cartilage.

Case 5. A 15-year-old white male was referred by Dr. J. E. Smith from the Trachoma Hospital at Rolla, Missouri, to Barnes Hospital on August 17, 1936, because of a mass behind the mesial half of the left upper eyelid.

Since the swelling was first noticed 2½ years previously it had slowly become larger, displacing the left eyeball and causing the upper lid to droop. The condition had not been painful. The eye had been totally blind since birth.

The right eye and adnexa were apparently normal.

Family history and personal history were without significance.

Physical Findings: Behind the left upper eyelid and between the medial palpebral ligament and the trochlea of the superior oblique muscle there was present a soft mass which seemed to extend backward into the orbit. This had displaced the trochlea laterally and forward. The skin of the left upper eyelid over the swelling as well as the conjunctival

surface over the lacrimal sac when the lid was everted had a bluish tint. There was present almost a complete ptosis. The eyeball was displaced laterally and downward into the temporo-inferior angle of the orbit. There was present a complete posterior synechia with atrophy of the iris. The anterior chamber was shallow with an iris bombé. A mature cataract and band keratitis were also present.

Posterior-anterior X-ray studies of the left orbit showed a poorly defined irregular area of rarefaction in the infero-temporal portion of the left orbit. This was suggestive of a destructive process in the left orbit.

In the opinion of the ear, nose, and throat specialist the orbital tumor did not involve any of the sinuses.

Laboratory Findings: Negative.

Operation: On August 21, 1936, an enucleation of the left eye was performed with the removal of the orbital tumor. After the majority of the mass was removed, the base at the apex of the orbit was clamped and ligated, leaving some of the tumor at the root of the orbit.

The postoperative course was uneventful.

Microscopic Pathology: The excised tissue showed a well-marked capsule of irregular thickness. Connected with the capsule in places were large masses of connective tissue. Some of the latter formed thick extensions into the interior of the growth. All the masses of connective tissue contained irregularly arranged collections of lymphocytes, occasional follicles, groups of fat cells, and elastic-tissue fibers (fig. 5). The essential constituents of the tumor were large blood-lacunae with only an endothelial lining.

Diagnosis: Cavernous hemangioma.

The totally blind left eye enucleated at the same time the hemangioma was removed showed atrophy of the eyeball, due to a primary exudative retinitis with a complete detachment of the retina.

Case 6. A 2-months-old white female infant was admitted, on October 12, 1936, to the Saint Louis Children's Hospital because of a suspected tumor of the right orbit.

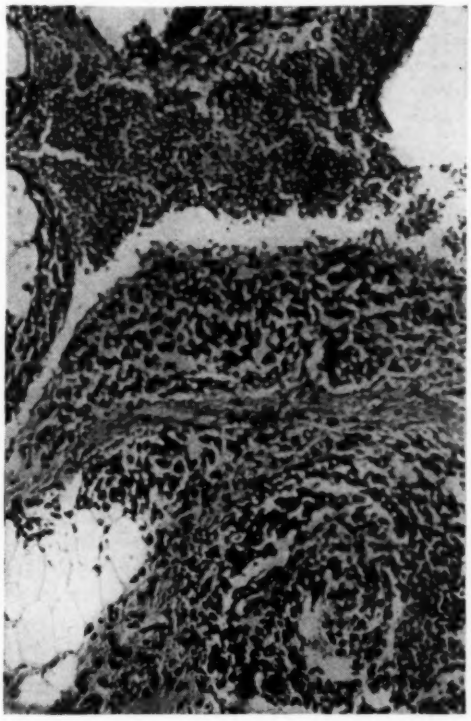


Fig. 5 (Meisenbach). Case 5. Section through small part of cavernous hemangioma, showing small lymph follicle inferiorly, and superiorly part of a large blood lacuna partially filled with red corpusces. × 150.

About six weeks previous to admission, the parents had noticed that the right eye was swollen and red. Since then this swelling had progressed rapidly.

Family history and personal history were irrelevant.

Physical Findings: Examination was entirely negative except for the right eye. The right eye was definitely more prominent than the left eye, with a dull-red edematous swelling of both eyelids and the ocular and palpebral conjunctivae.

The eyeball was displaced laterally and upward. The pupils were equal and reacted well to both light and accommodation. The intraocular tension was normal in each eye.

Because of the rapid increase in the size of the growth, a malignancy was suspected and an operation was advised immediately.

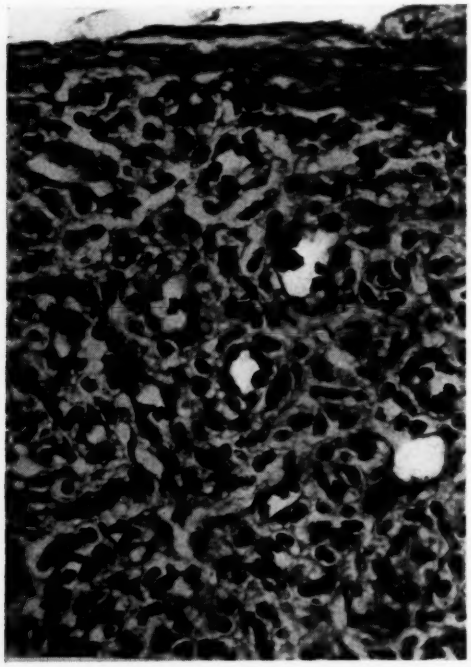


Fig. 6 (Meisenbach). Case 6. Section through small part of simple hemangioma, showing irregularly thick connective-tissue septum superiorly, and below numerous small capillaries separated by endothelial cells proliferating from the capillary linings. × 375.

Laboratory Findings: Negative.

Operation: On October 2, 1936, Dr. Lawrence T. Post removed the tumor from the right orbit by means of a horizontal incision through the lower eyelid, the dissection curving downward through the orbital septum. Behind the septum there was encountered a dark-red, solid mass which dissected free posteriorly. Anteriorly, the growth was not encapsulated, but the posterior portion of the tumor was encapsulated. This was probably due to the fact that the capsule was removed anteriorly during the exposure. The mass measured 3 by 2 by 1 cm.

The postoperative course was uneventful.

Microscopic Pathology: The excised tissue showed at several points a well-demarcated capsule of collagenous tissue extending in many places into the interior of the growth. Throughout the growth were found many round or flattened blood capillaries, lying between compact groups of cells (fig. 6). Many large veins and arteries of varying caliber were seen scattered throughout the growth in the connective-tissue septa. In several of these large blood vessels, both the internal and external elastic membranes were present. One large vessel showed an endovasculitis with endothelial and some elastic-tissue proliferation into the lumen of the vessel.

The groups of cells were very incompletely separated from each other by the small thin-walled capillaries. The cells were compactly arranged. The nuclei were irregular, oval, or spindle-shaped in form and stained fairly lightly. They were endothelial cells.

Diagnosis: Hemangioma with considerable diffuse proliferation of endothelial cells.

Summary

Six cases of hemangioma of the orbit are reported: one a simple hemangioma; one a simple hemangioma of the lacrimal gland; one a cavernous hemangioma; one a simple hemangioma with considerable proliferation of endothelial cells; another a fibrohemangioma, composed mostly of thick-walled arteries and veins; and the last, a hemangio-endothelioma composed mostly of blood vessels with thickened walls.

The last two growths are unique in ophthalmic pathology, being composed of thick-walled vessels in greater number than capillaries. We have been unable to find reports of any similar growths of the orbit in the literature.

It is interesting that one individual did not appear for removal of the tumor until 63 years of age and another not until 43 years of age. Four of the six tumors were not encapsulated.

I desire to express my appreciation to the members of the Barnes Hospital staff for permission to report the cases which form the basis of this paper. I desire also to express my appreciation to Dr. Harvey D. Lamb for his kindness in reading the manuscript and his contribution of the pathological reports, without which this paper could not have been completed.

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All sections and photomicrographs in this article were prepared at the Laboratory for Ophthalmic Pathology, Washington University School of Medicine.

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IS MYOPIA A DEFICIENCY DISEASE?*

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It is with much trepidation that we initiate this discussion since we fully realize that the arguments presented are contrary to all present classical theories as to the etiology of myopia. But we take courage when we reflect that less than 50 years ago the medical teachers ridiculed the idea that diet could have anything to do with causing rickets or scurvy.[1] Our entering into this study has been like penetrating an untrodden wilderness without guide or compass. We realize that we can do little more in this initiatory report than to set the medical profession to thinking.

We have been practicing ophthalmology long enough to have followed cases from babes in arms to men and women in middle life. During this time we have noticed cases of beginning myopia gradually progress, some to a state of malignant myopia. In all such cases we have been helpless, save only to make refractive changes as conditions indicate. However, during these years, we have made certain observations and investigations of which this paper is a report.

As time has passed, we have become more and more impressed by the physical difference between the hyperopic person and the myopic. In considering this aspect, we have in recent years made inquiry of patients as to their habits of eating and study and their inclinations toward physical activities. Since the recent studies of vitamin influence on health and growth have appeared, we have been making an investigation of nutrition as a cause of myopia. Our reasoning has been along this line, that if improper diet may produce rickets and like conditions, why may not a lack of certain vitamins or necessary food elements inhibit the proper development of the scleral fibers, leaving these fibers more or less elastic and unstable?

With this hypothetical question in mind, we decided, in January, 1939, to send out a questionnaire in the hope of obtaining information that would indicate, at least, a definite lead.

The only instruction given to the patient, as to the purpose of the questionnaire, was as follows:

"The following questionnaire is a part of a research study we are making of the eyes and their refractive conditions in connection with diet and exercise. It would be very helpful to us if you would fill in the answers and return the questionnaire to us at your earliest possible convenience. Your coöperation will be appreciated.[11]

We sent out over 100 questionnaires to myopic patients and a like number to hyperopic patients who have appeared at our office during the past six or seven years. We selected patients whose total refractive error was not less than 1.50 diopters. The information we received appears to confirm the idea that myopia is largely a nutritional disease.

It would be well to analyze the questionnaire and the answers we received.

Question 1 undertakes to ascertain the character of food (quality) of which the individual partook. We have taken their answers, "mixed diet" and "normal diet" to mean a balanced diet. We realize

* Read before the Kansas City Society of Ophthalmology and Otolaryngology in conjunction with the Kansas City Southwest Clinical Society Fall Clinical Conference. October 5, 1939; and before the Kansas City Pediatric Society, on September 19th.

Name..... Address..... Age.....

	Yes	No
1—During the growing years what kind of a diet did you prefer?		
2—Were you a hearty eater as a child, especially of meat?		
3—In eating meat did you carefully pick out the muscular fibers and discard all connective tissue and fat?		
4—Were you in the habit of cutting off a bite of meat and eating it, if it contained all of the tissues and fat?		
5—Did your habits of eating continue through your entire growing period of years?		
6—Were you naturally inclined or urged to use the eyes to excess for close work or reading etc.?		
7—Were you studious through the growing period, spending long hours at study and reading?		
8—Were you inclined to an indoor sedentary life?		
9—Were you athletically inclined, loving and participating in outdoor sports and games?		

such questions and answers to be quite unscientific. A balanced diet for a person of sedentary life is quite different from one for a person leading a physically strenuous life. Although these answers can be but relative, they can give data of importance. You will note the hyperopic patients show in the tabulation a larger percentage of a balanced diet than do the myopic.

From Question 2 we hoped to learn of the quantity that each individual partook, especially of meats. This, too, is but a relative matter. The quantity of food consumed by one individual may be much less than the average; nevertheless, he may believe himself to be a hearty eater. This opinion of hearty eating depends upon the habits of activity. Here again, the hyperopic individual, requiring larger quantities of food, is shown to be the most vigorous.

It was Questions 3 and 4 that were of most interest, showing characteristic habits of the myopic person as contrasted with the hyperopic. These two questions are the same but asked in a different manner. These facts bear on Questions 1 and 2. Answers to Question 1 indicate 84 percent partook of a balanced diet. Answers to Questions 3 and 4 show this not to be a fact, as 85 percent of the myopic subjects discard very necessary elements of food. Also when the eating habits of the myopic and those of the hyperopic are observed, it will be noted that when a balanced diet is served to each, the myopic individual will pick over his food and leave about one third on his plate, while the hyperopic will clean the platter and look longingly for more helpings. In brief, the myopic person is a "picker" while the hyperopic is a "licker." This difference in the quantity of food alone would tend to develop an asthenic individual in the one, and an athletic individual in the other. The answers to Question 4 give a slightly different but similar result to that of no. 3.

As shown from Question 5, the habits

established in infancy, as a rule, become fixed habits for life. A slight deficiency of certain food elements or vitamins will eventually leave a mark in the physical structures of the body. Nictalopia and xerophthalmia may not be the only ocular results of avitaminosis.

Questions 6, 7, 8, and 9 have to do with the old theories as to the etiology of myopia. The data we received did not substantiate the old theories.

Question 6 shows that 69 percent of the myopic are inclined to close work as opposed to 44 percent of the hyperopic.

While the myopic individual is shown to be inclined to a more sedentary life than the hyperopic, we believe this condition to be due to the character and quantity of food consumed. This disinclination on the part of the myopic to athletics is due to a lack of rich food stimulation which causes him to lapse into a sedentary existence and to establish a vicious cycle: indoor occupation, lack of physical thrill, lack of sunshine and pure air, lack of interest in rich diet. The hyperopic, on the other hand, craving a well-balanced diet will have the urge to get out in the open and enjoy strenuous athletics.

TABLE 1

COMPARISON OF LIFE HABITS OF THE HYPEROPIC AND THE MYOPIC, AS SHOWN BY THE QUESTIONNAIRE

		Yes %	No %
1—During the growing years what kind of a diet did you prefer?*	+	83+	16+
	−	80+	19+
2—Were you a hearty eater as a child especially of meat?	+	54+	45+
	−	46+	53+
3—In eating meat did you carefully pick out the muscular fibers, discarding all connective tissue and fat?	+	45	55
	−	85	15
4—Were you in the habit of cutting off and eating a bite of meat, even though it contained all of the tissues and fat?	+	58+	41+
	−	26+	73+
5—Did your habits of eating continue through your entire growing period?	+	96+	3+
	−	84+	15+
6—Were you naturally inclined or urged to use the eyes to excess for close work or reading, etc.?	+	44	56
	−	69	31
7—Were you studious through the growing period spending long hours at studying and reading?	+	68	32
	−	69	31
8—Were you inclined to an indoor sedentary life?	+	27	73
	−	46+	53+
9—Were you athletically inclined participating in outdoor sports and games?	+	68	32
	−	53+	46+

* Answers to *question one* refer to balanced diet—Yes, meaning a balanced diet; No, means other than a balanced diet. Plus indicates Hyperopia; Minus indicates Myopia.

It is our contention that the quantity and the quality of food intake of the growing child have much to do with his inclinations and activities, and, in turn, with his physical development.

Thus arises our problem: Can we show that this loss of fat and connective tissue from the diet in the growing child has something to do with the production of these scleral changes? It is to this end that we direct the serious attention of the medical profession.

Bearing in mind that fat is carefully avoided by the myopic, let us investigate the need of fat in food, especially in the growing child. It has been established by the biochemist that animals will become ill if fed exclusively on a fat-free diet. It is also established that the regular diet should contain approximately 8 or 10 percent fat in order to convert carotenes (vitamin-A precursor) into vitamin A *in vivo*. This takes place only in a well-balanced diet that contains sufficient fat for a solvent.

Vitamin A is essential to growth and health, as has been shown by biochemists. Basher Ahmad[2] of the University College, London, says: "There is now ample evidence that the administration of carotene to animals fed on a vitamin-A-deficiency diet is followed by a return of health, and the appearance in the liver of a substance showing the properties of vitamin A." After going through a long series of experiments, Ahmad states in the summary: "The absorption of carotene from the intestinal tract may be considerably affected by the composition of the diet. Rats fed on a fat-free diet excreted as much as 90 percent of the pigment when it was administered in the form of a solution in ethyl laurate. Absorption was nearly complete when the basal diet contained 10-percent fat. Imperfect diet was also observed with rats fed on a diet of lean meat and skimmed milk."

Esther L. Batchelder[3] of Columbia University in her report on "Nutritional significance of vitamin A throughout the life cycle" after describing her experiments in detail, in which she fed rats different amounts of butter fats—8, 4, 2, 1, and 0.5 percent—says: "Each decrease in butterfat below 4 percent resulted in slower growth and in lower adult weight at all ages. . . . From the point of view of general nutrition, 8-percent butterfat apparently supplies more than sufficient vitamin A for the requirements of growth and successful reproduction without inducing an inconveniently large store in animals to be used for vitamin-A tests. . . . These results indicate that the vitality of rats is affected in various ways by a deficiency of vitamin A."[4]

In showing that the myopic person discards a necessary food element in throwing away fats, we do not mean to suggest that one should eat fat as the Eskimo eats blubber. However, without the consumption of this fat, the carotenes of food are not converted into vitamin A, so that the patients lose not only the vitamin A contained in the fat, but also that which is formed from the carotenes. This necessity of animal fat as an important element in food and as a solvent for carotenes has not been sufficiently emphasized by the medical profession, and the laity has not been duly informed by the medical profession of its importance to the growing child.

How often do we see this: The farmer, in order to sell his livestock to the packer, must produce a well-fatted animal. The customer will not buy the meat from the butcher unless it is rich in fat. The housewife buys it, takes it home, cooks and serves it, and the family throws the fat and other valuable foods away. Then she hastens to the drug store and buys the needed vitamins for the children. While we have no criticism of the vitamins that can be bought at the drug store, we are convinced that no amount of "Vitamins" can supplant that found in a well-balanced diet, properly consumed and assimilated. These animal fats, therefore, are very necessary to the growing child, affecting the scleral development as well as all other body structures.

Meat, as a whole, is not widely used in Japan. The food of the Japanese indicates a deficiency of vitamin A. The main diet

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Meat, as a whole, is not widely used in Japan. The food of the Japanese indicates a deficiency of vitamin A. The main diet

TABLE 2

FOOD AND OTHER HABITS OF HYPEROPIC PATIENTS

Questionnaire Condensed	Patients	J. E. Mc.	J. H. B.	C. F. T.	O. K. M.	K. M. R.	O. J.	N. A.	Y. E. M.	R. N. C.	E. R.	G. K. B.	F. W. C.
Total refractive error	O.D.	+2.00	+2.50	+3.25	+3.75	+2.00	+4.75	+2.50	+5.50	+2.75	+2.25	+3.50	+2.25
Total refractive error	O.S.	+1.75	+2.50	+3.75	+3.75	+2.00	+4.75	+2.00	+5.50	+2.75	+2.25	+3.75	+2.50
Kind of diet preferred?	1	Mix	Mix	Mix	'Mix	Nor.	Nor.	Nor.	Mix	Mix	Mix	Mix	Mix
Hearty eater as a child?	2	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes
Ate muscular fibers only, discarding all other tissues?	3	—	No	No	No	No	No	No	No	No	No	Yes	No
Ate muscular connective and fatty tissues?	4	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Habits of eating continuous?	5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Naturally inclined to reading?	6	No	No	No	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes
Studious during childhood?	7	Yes	Yes	Yes	No	Yes	—	Yes	No	No	No	Yes	Yes
Inclined to indoor life?	8	No	No	No	No	No	Yes	No	No	No	Yes	No	Yes
Athletically inclined?	9	Yes	Yes	Yes	Yes	Yes	—	Yes	Yes	Yes	No	Yes	Yes

of the urban Japanese is polished rice, while that of the rural Japanese is soy beans. One-and-a-half pounds to the individual is the annual amount of meat consumed by the Japanese. These people have a large national problem in the poor eyesight of their young men. W. B. Courtney in his article "Brown and yellow bombers"[5] reports that a Japanese army flight surgeon said, "Our greatest difficulty in getting pilots is neither mental nor emotional—but defective vision, which is a national problem." After reading this statement we communicated with Katsuji Kato, M.D., of the University of Chicago (Department of Pediatrics) who in his letter of August 21, 1939, says: "In answer to your questions I may say that the Japanese are very much inclined to myopia, and I may also say that during the growing period of life, the majority of young students have a tendency to one-sided diet. Even in well-to-do families, the students are forbidden to indulge in wholesome and well-balanced diet. They are taught in the matter of frugality, and a number of these young people take for their lunches to school only a fist-sized ball of cooked rice and a small helping of pickles, and nothing else. Or they may buy their lunches from the lunch counters established by the school and one or two pieces of sweet rolls are all they usually eat. This practice has a rather logical foundation in that these young people are trained to endure any hardships that may come in the future, and that they will be better prepared to go through the adversities of life if they are brought up on a meager diet than on a more luxurious diet. This logic, to me, appears a little prejudiced, since by the so-called frugal habits of eating, these young people are really undermining their fundamental constitution. So you see the diet of the Japanese consists chiefly of starchy food and very little proteins, although vegetables are fairly adequately consumed." We have used the Japanese as an example here but we are informed that other races exhibit similar characteristics.[6]

Are not these statements of racial ex-

TABLE 2—*Continued*

FOOD AND OTHER HABITS OF HYPEROPIC PATIENTS

N. S.	E. D.	R. A. S.	N. G.	A. B. B.	J. R. H.	F. A. H.	R. C. C.	A. W. B.	W. R. S.	D. E. H.	A. T. K.	R. K.	W. H.	Yes	No	Yes %	No %
+2.00	+5.25	+2.50	+2.75	+4.00	+2.50	+3.75	+3.25	+5.00	+2.25	+2.50	+2.25	+4.50	+5.00				
+1.75	+5.75	+1.25	+2.75	+5.00	+2.50	+4.50	+3.25	+7.00	+2.25	+3.75	+3.25	+4.50	+5.00				
Mix	Mix	Mix	Mix	V. & F.	V. & F.	V. & F.	Mix	Mix	—	Mix	Mix	V. & F.	—				
No	No	Yes	Yes	No	Med.	Med.	Med.	Yes	Yes	Yes	Yes	No	No	14	12	54+	45+
No	No	No	?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	?	Yes	Yes	10	13	45+	56+
Yes	Yes	Yes	?	No	Yes	No	No	No	No	No	?	No	No	14	10	58+	41+
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	25	1	96+	3+
No	No	No	—	Yes	Yes	No	Yes	No	No	Yes	—	No	Yes	11	13	44	56
Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	No	Yes	17	8	68+	32+
No	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	7	19	27	73
No	No	No	No	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	17	8	68+	32+

hibitions of ocular pathology due to a deficiency diet, especially of fats?

We mentioned that these myopic people also discard from their food all fascia, fibrous, and connective tissue. Are these tissues of importance to metabolism? The study from a biochemical standpoint indicates the loss of fibrous tissue when associated with vitamin-A loss may be of importance. The various organs and structures of the body are able to select for their use from the blood stream those elements (amino acids) required for their growth, development, and support, provided the blood stream contains these needed elements. In the digestive process, the various foods lose their identity when absorbed, and enter the blood stream. Of the protein consumed, the various amino acids are formed. These are numerous. New combinations are formed for building tissue in growth. The various types of new tissue are required in the growing body. It is necessary that the blood contain the proper amino acids to complete the growth of such organs. This can be obtained only through the food consumed.[7] The food elements for body building and support are legion and we will not undertake enumeration.[7b] Only this fact is it necessary to emphasize: when we fail to furnish all necessary elements and in the proper quantities in the diet, a penalty is imposed.

Recent investigations have shown that pathological conditions arise in the lower animals when fed on certain deficiency diets. They are cured by feeding mucin. Erosions of the lining membrane of the gizzard of the chicken and gastric ulcers in the dog have been produced by a deficiency diet and cured by feeding mucin. (The lining membrane is a fibrous structure.) A dietary factor for chicken-gizzard erosion is discussed by C. A. Elvehjem and collaborators.[8] They claim that a reticulin preparation from lung tissue is potent and that the potency is due to its chondroitin contents. Much is claimed for mucin in the treatment of gastric ulcers in the human. It is claimed that the benefit is not due to its local ef-

TABLE 3

FOOD AND OTHER HABITS OF MYOPIC PATIENTS

Questionnaire Condensed	Patients	A. H.	J. I. S.	C. L.	E. W.	A. B. R.	L. H.	D. H.	C. H.	B. L. H.	M. G.	P. C.	E. C.
Total refractive error	O.D.	−1.00	−18.00	−4.25	−2.25	−2.00	−3.25	−8.00	−1.00	−1.00	−4.25	−2.75	−2.00
Total refractive error	O.S.	−1.00	− 7.00	−4.25	−2.50	−2.00	−2.50	−7.50	−1.25	−1.00	−3.50	−2.00	−2.25
Kind of diet preferred?	1	Mix	Mix	Mix	Mix	Mix	Mix	Sweets	Sweets	Mix	Mix	Mix	Mix
Hearty eater as a child?	2	Yes	No	No	Yes	Yes	No	No	No	Yes	No	No	Yes
Ate muscular fibers only, discarding all other tissue?	3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ate muscular connective and fatty tissues?	4	No	Yes	No	No	No	No	No	No	No	No	No	No
Habits of eating continuous?	5	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Naturally inclined to reading?	6	Yes	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	Yes
Studious in childhood	7	Yes	No	Yes	Yes	No	Yes	No	Yes	No	No	No	Yes
Inclined to indoor life?	8	No	No	Yes	No	No	Yes	No	Yes	No	Yes	No	Yes
Athletically inclined?	9	No	No	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes

fect but to its use in metabolism, that the chondroitin element is the curative property, and that the fibrous-tissue element, from which mucin is made, is the effective element. Chondroitin is shown then to be of importance in metabolism. Would not this indicate the necessity of fibrous tissues in the diet? This subject is one we leave as a suggestion to the biochemist for further study? Would a loss of fibrous tissue and fascia from the food, when associated with vitamin loss, have an influence in metabolism, especially of the scleral structures?

For further corroboration of our position we again refer to the "Newer knowledge of nutrition"[7b]: "In the early days of vitamin research the growth property of vitamin A was emphasized. A number of investigations demonstrated that the deprivation of this nutrient results in cessation of growth and that the requirement of this vitamin for growth and health is greater in the young animal. It has also been observed that growth varies with the amount of the vitamin in the diet and the amount stored in the tissues of animals. However, growth failure in itself is not specific evidence of vitamin-A deficiency; it is believed that interruption of growth resulting from lack of vitamin A is a secondary result of a disturbance in the metabolism of epithelial tissues. This interruption of growth, common to both infants and to laboratory animals, is associated with loss of weight due largely to loss of fat in all storage deposits, and also to atrophy of musculature and many organs."

May not the sclera, having the same mesoblastic origin, be similarly affected by such vitamin losses?

EXPERIMENTAL

In an effort to demonstrate this scleral change the following experiments were made on 14 rats (at weaning time). Seven were used as "controls" and seven as "experiments." The controls were fed a balanced diet similar to that on the table of the human. Those in the experiment cage were fed a similar diet but deficient in fats. The experiment was continued for some 80 days. The following results

TABLE 3—*Continued*

FOOD AND OTHER HABITS OF MYOPIC PATIENTS

E. A.	M. B. M.	A. M. B.	T. A. S.	S. M.	B. G.	C. E. S.	E. A.	J. J. S.	L. W.	G. B.	J. P. M.	A. A. M.	A. D.	Yes	No	Yes %	No %
−5.00	−4.00	−9.00	−7.00	−1.00	−1.50	−3.00	−3.00	− .50	−2.00	−4.00	−2.50	−4.50	−2.00				
−5.00	−4.00	−5.00	−4.50	−1.00	−1.50	−5.00	−3.00	− .75	−2.00	−4.00	−2.50	−4.50	−2.50				
Sweets	Mix	V. & F.	Mix	Mix	Mix	Mix	Veg.	Mix	Mix	Mix	Mix	Mix	Mix				
No	No	No	Yes	Yes	Yes	No	No	Yes	No	Yes	No	Yes	Yes	12	14	46+	53+
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	22	4	84+	15+
No	No	No	No	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	7	19	26+	73+
Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	22	4	84+	15+
Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	18	8	69	31
Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	18	8	69	31
Yes	Yes	No	No	No	No	Yes	Yes	Yes	No	No	Yes	No	Yes	12	14	46+	53+
Yes	No	No	Yes	Yes	Yes	Yes	No	No	Yes	No	No	Yes	No	14	12	53+	46+

were obtained as affecting the eyes:

Dr. C. G. Leitch, pathologist, Kansas City, Missouri, examined the eyes of three "controls" and three "experiments" and found them negative for any inflammatory pathology. Dr. L. L. Eisenbrant of the University of Kansas City examined the eyes of the other eight rats. His report may be tabulated as follows:

55 Scleral Measurements of 8 Rats

Each eye (scleral thickness) measured near ora serrata, bulbar equator, and macular region.

4 Controls cm.	4 Experiments cm.
1—0.0600 Fem.	1—0.0705 Fem.
2—0.0990 Fem.	2—0.0801 Fem.
3—0.1406 Male	3—0.1080 Male
4—0.0927 Fem.	4—0.0640 Fem.
Aver. 0.0981	Aver. 0.0807

Experiment shows 18-percent scleral deficiency. This may not be significant yet it indicates a tendency in this direction, even when the food was only reduced in vitamin A.

DISCUSSION

In London an experiment was made on rats with complete avitaminosis A. As a further substantiation of our theory, we present an abstract from a report of Drs. Mutch and Richards,[9] an abstract of which appeared in the Jour. Amer. Med. Assoc., Aug. 19, 1939. "Mutch and Richards produced keratoconus experimentally as a sequela to acute xerophthalmia in rats on a vitamin-A-free diet. In most cases the corneas regained their normal contour after animals were given vitamin A for a few weeks. Corneal nebulas and myopia remained as permanent defects. In view of this it seems probable to the authors that, in countries in which xerophthalmia among the human population is not uncommon, varying degrees of keratoconus should be found. Chronic and low-grade xerophthalmia due to suboptimal intake of vitamin A may be more prevalent than is realized. The corneas may be weakened by intermittent attacks, and permanent stretching of the tissues may take place without obvious vascularization or other pathological sign. Keratoconus in European countries is rare, myopia and myopic astigmatism are common, their production may be due to the

same mechanism. The authors do not suggest that keratoconus is due in every case to avitaminosis A but they do know that, owing to the lack of vitamin A, ocular lesions can be produced experimentally in 100 percent of rats and keratoconus with comparative ease. In the human child exactly similar lesions of the eyes going on to perforation are produced by vitamin-A deficiency. Therefore it does not appear unreasonable to them that if a child is receiving a diet deficient in vitamin A the corneas and sclera may become weakened and unable to withstand the increased pressure when the child is eventually given an adequate diet. Keratoconus will probably not develop in the child but myopia and myopic astigmatism will, if the pathologic changes in man are comparable to those of the rat."

Since the influence of heredity in myopia has long held an important place in literature,[10] we should not omit a look into this argument briefly at this time. Oh heredity, how many orphans are laid at thy door! In the case of many of these "waifs" (cases of unknown etiology) heredity is not guilty. By reason of our more recent study we are convinced that heredity plays but a minor role in the cause of myopia.[6]

True, there are cases that have all the appearance of having an hereditary background, since myopia appears in several generations. But many families have dietary habits, with elements of deficiency that are handed down from generation to generation. I have known families that required hot biscuits three times daily. I have known families in which both parents discarded essential vitamins continuously. Would not these parents be expected to provide similarly for their children? Recent investigations[6b] show that it is not only necessary for full development that proper food be selected for their children during the growing period and during the period of gestation, but still further back. Both parents should have food fit for the "child to be," long before conception occurs. We are informed that primitive peoples see to this.[6c] Yet with high enlightenment in other respects, this forethought is neglected among civilized people. Alverez* says: "Curiously where civilized man has failed, primitive man has succeeded." In the case of primitive people whose perfect physical development has come down through many generations, and who have adopted the deficiency diet of civilized races for a period of time, numerous and various physical defects have been produced in one or two generations.

Among civilized races many people have adopted refined foods for themselves and for their children, rather to suit the taste than for the physical well being. We quote Dr. Alverez again, "Another danger that arises when a man begins to eat large amounts of white bread and sugar is that these incomplete foods so satisfy his hunger that he loses interest in obtaining an adequate ration of protective foods." Too much, as parents have we neglected to select proper diet to prepare ourselves for parenthood; and after our children have been placed in our charge, we have lacked the knowledge or courage to see that they cultivate tastes for such food and are required to eat these foods that are best for their full development. Where such improper diets are followed in families and physical defects such as myopia occur, we are inclined to class such cases as heritable. Probably there are hereditary cases of myopia, as there are of other physical family traits, but nature is prone to correct these defects where opportunity is af-

*The article of Walter C. Alverez, M.D., "Why can't we have perfect teeth?" appeared in *Harper's* October, 1939.

forded, rather than hand them down from generation to generation. To quote Dr. Katsuji Kato again, he says: "I think the Japanese children born and reared in America have a very much more balanced diet than those in Japan proper. In fact, the diet these children here take is no different from that consumed by average American children. While I was in private practice for seven years in Los Angeles, I got the impression that there were relatively few instances of myopic children. It is my conviction that myopia is decidedly less frequent among Japanese children in America than in Japan." In other words, myopia of apparently hereditary origin behaves as a recessive rather than a dominant characteristic.[6e]

A question may arise regarding the cases where myopics eat fats and the hyperopics refuse to eat fats. This may be answered by the fact that visual axes at birth are not uniform. For example, I examined a five-year-old child, a few weeks ago, who had eight diopters of hyperopia. In this case the loss of fat may be of advantage in an effort to increase the antero-posterior axis, and should he by discarding fat increase the axial length five diopters, he would yet be three diopters hyperopic. Likewise, there are cases approaching near myopia at birth. In such cases the normal amount of fat in the diet cannot be expected to bring about a check of the visual axial development, as there will be a congenital myopia in spite of any corrective diet that may be prescribed.

Summary and Conclusion

A large percentage of myopic people are prone to discard fats and other essential foods from their diet. At least 8 percent of fat in the diet is essential for health and growth because of the vitamin A these fats contain and also as a solvent for carotenes. Clinical and experimental evidences are produced to show that myopia is found where such food elements are lacking in the diet. Therefore, in answering the question, "Is myopia a deficiency disease?" it appears not unreasonable to conclude that myopia is largely due to dietary deficiency.

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TRACHOMA IN JAPAN

WITH SPECIAL REFERENCE TO PUBLIC HEALTH

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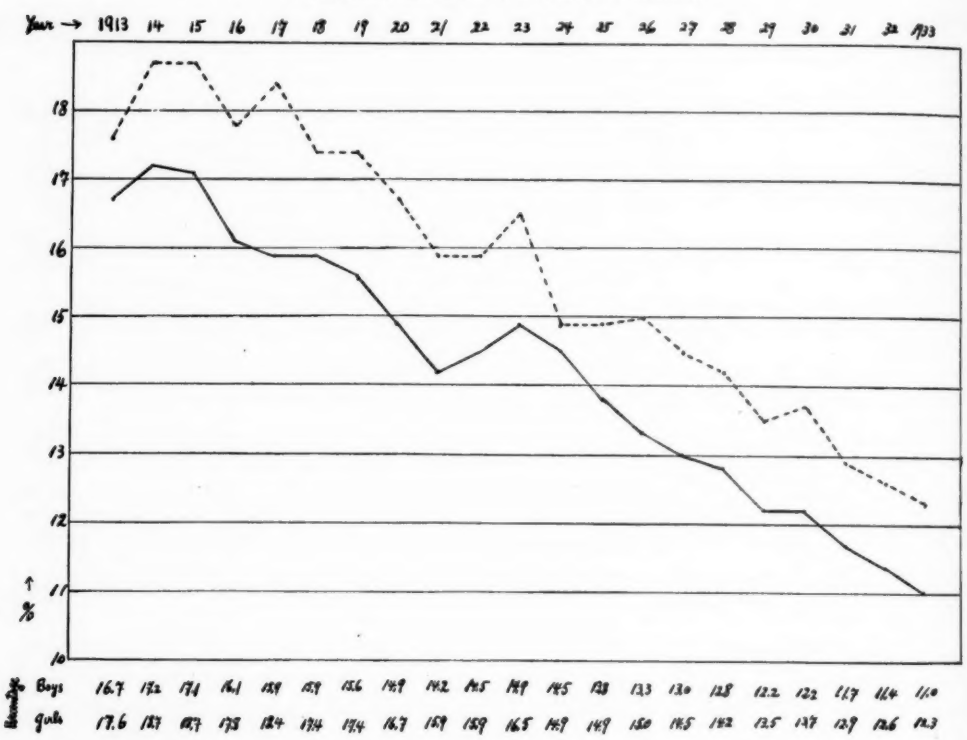
Trachoma is a communicable conjunctivitis which often causes many complications and serious sequelae affecting visual acuity. It can be an important problem in public-health administration in communities where many trachoma patients are found.

A trachoma campaign can be successful if it is taken up as a public-health problem and adequate measures are carried out.

Although there is no history of a severe epidemic of trachoma in Japan, there is evidence that trachoma patients were recognized about 100 years ago. Examinations carried out in the elementary schools throughout Japan indicate a trachoma index and trend as shown in table 1. The trachoma index of the youths of recruiting age of 20 decreased from 23.1 percent in 1909, to 9.6 percent in 1933; that of persons in special professions controlled

TABLE 1

TRACHOMA INDEX OF THE SCHOOL CHILDREN



Although there are very few trachoma cases in some countries, their number is still large in others. Historical evidence indicates that even the former had severe epidemics of trachoma before the disease was brought under some control.

* From the Tokyo Health Center.

by the trachoma prevention law, which I shall discuss later, was 4.3 percent in 1937.

The index varies in accordance with the living conditions of the people rather than with climatic factors. In Japan the trachoma index is very high in the northeastern prefectures which constitute one of the coldest districts on the mainland. Most people in these prefectures are farmers by occupation and are poor.

If we consider the index of trachoma in the world, it is high in hot countries, notably in Asia and Africa. History indicates that the French army under Napoleon I suffered severely from trachoma when they invaded Egypt, and after that trachoma prevailed in several European countries.

Thus, neither historical data nor the evidence of trachoma distribution in Japan supports the definition of trachoma as a tropical disease.

Kyobashi Ward in the city of Tokyo is the special district selected as a municipal public-health training field attached to the Institute of Public Health, which was founded by the Rockefeller Foundation. It consists of an island named Tsukishima and a part of the mainland, with areas of 1.55 and 3.62 square kilometers, respectively. The total population is about 150,000.

I examined about 14,000 school children of 13 elementary schools in the ward. The result is shown in table 2. MacCallan's classification of trachoma was used. I added one more category, "Suspicious trachoma." There are cases of monocular trachoma; also one can recognize different stages of trachoma in the two eyes of one patient. Usually both eyes manifest much the same symptoms. The numbers in the table indicate the number of patients. Cases showing different stages of trachoma in the two eyes were classified with reference to the more severe symptoms.

In Japan, almost all of the children of school age attend elementary schools. Therefore the trachoma index of the school children can be considered as representing that of trachoma among the inhabitants in general. In my opinion, the chief place for contagion lies in the family life itself, and examinations of school children very often reveal the state of familial contamination with trachoma.

Kyobashi Ward can be roughly divided into four parts with reference to the trachoma index. This classification very closely coincides with the living standards of the inhabitants. The mainland is a commercial district, in which Regio 1 represents the richer section. The island is an industrial district in which Regio 4 represents the poorer section, although it is not one of the poorest districts in the whole city.

In contrast to Kyobashi Ward, I quote the trachoma index in a rural elementary school of Akita prefecture, which is one of the six northeastern prefectures, where trachoma is very prevalent. It is noticeable that, although the trachoma index is so high, one finds few cases of follicular conjunctivitis and folliculosis, a circumstance to which I shall refer later.

These examinations were all carried out by me in 1938.

Recently, I examined the eyes of family members of trachomatous school children, in order to ascertain the family contamination with trachoma. Examinations could not be performed on all the members of all the families, sometimes all but one, sometimes three or four members of a family.

Twenty-six out of 41 families revealed trachoma patients other than the school child previously examined. Six of these families were so heavily infected that all of the examined family members were trachomatous.

Correlation between trachoma and fol-

TABLE 2

CLASSIFICATION OF TRACHOMA IN SCHOOL CHILDREN AND TRACHOMA INDEX (Kyobashi Ward)

Region	School	Male							Female							Total							
		Number Examined	Susp. Tr.	Tr. I	Tr. II	Tr. III	Tr. IV	Total	Number Examined	Susp. Tr.	Tr. I	Tr. II	Tr. III	Tr. IV	Total	Number Examined	Susp. Tr.	Tr. I	Tr. II	Tr. III	Tr. IV	Total	Percentage of Trachoma
1	I	398	0	0	0	0	0	0	455	2	2	0	1	0	5	853	2	2	0	1	0	5	0.6±0.26
	II	431	3	2	0	1	0	6	415	4	0	0	0	0	4	846	7	2	0	1	0	10	1.2±0.37
	III	473	2	1	1	4	0	8	482	0	2	1	1	0	4	955	2	3	2	5	0	12	1.3±0.37
	IV	250	1	2	0	2	1	6	255	0	1	0	0	0	1	505	1	3	0	2	1	7	1.4±0.52
	V	587	2	5	0	0	1	8	573	3	4	0	0	1	8	1160	5	9	0	0	2	16	1.4±0.34
2	VI	650	4	6	4	1	0	15	654	8	9	2	2	1	22	1304	12	15	6	3	1	37	2.8±0.45
	VII	756	9	11	3	3	0	26	691	10	9	4	0	0	23	1447	19	20	7	3	0	49	3.4±0.47
	VIII	537	5	9	0	3	1	18	555	8	8	2	2	0	20	1092	13	17	2	5	1	38	3.5±0.55
	IX	523	5	11	1	2	0	19	451	4	13	8	3	0	28	974	9	24	9	5	0	47	4.8±0.68
3 (Island)	X	927	35	26	11	15	5	92	941	34	18	7	12	0	71	1868	69	44	18	27	5	163	8.7±0.65
	XI	239	7	12	2	4	0	25	194	0	4	4	5	0	13	433	7	16	6	9	0	38	8.8±1.36
	XII	663	18	20	8	13	0	59	585	22	17	5	11	2	57	1248	40	37	13	24	2	116	9.3±0.82
4 (Island)	XIII	591	36	25	13	17	0	91	606	45	24	13	15	0	97	1197	81	49	26	32	0	188	15.7±1.05
	Total	7025	127	130	43	65	8	373	6857	140	111	46	52	4	353	13882	267	241	89	117	12	726	5.2±0.18
	C*	291	16	33	13	17	0	79	322	31	50	37	19	0	137	613	47	83	50	36	0	216	35.2±1.84

* C signifies a contrast, which was obtained from the result of the eye examinations in a rural elementary school in Akita prefecture.

TABLE 3

PERCENTAGE OF TRACHOMA AND FOLLICULOSIS IN ELEMENTARY SCHOOLS

Year Class \ Name of School	I		II		III		IV		V		VI		VII		VIII		IX		X		XI		XII		XIII	
	Tr. %	Fol. %	Tr. %	Fol. %	Tr. %	Fol. %	Tr. %	Fol. %	Tr. %	Fol. %	Tr. %	Fol. %	Tr. %	Fol. %	Tr. %	Fol. %	Tr. %	Fol. %	Tr. %	Fol. %	Tr. %	Fol. %	Tr. %	Fol. %	Tr. %	Fol. %
1	1	12	0	16	2	7	0	10	0	10	3	8	2	11	1	13	2	5	6	1	7	1	10	0	11	1
2	0	12	3	9	0	11	1	9	1	10	0	8	3	8	0	9	2	7	7	3	9	6	6	0	11	5
3	0	3	2	13	0	12	0	11	3	9	1	5	1	9	6	9	5	8	20	4	8	6	13	0	8	4
4	1	9	1	5	1	10	3	13	2	5	2	4	5	10	5	4	4	3	5	6	16	7	12	0	15	3
5	1	8	1	9	0	7	0	13	2	3	7	10	4	7	5	10	8	3	7	7	8	0	8	0	25	3
6	1	9	0	7	4	11	4	13	1	12	4	5	5	4	4	6	10	3	7	4	6	2	7	0	28	1

liculosis: Folliculosis is defined as a condition in which there are numerous transparent conjunctival follicles with very little sign of inflammation, especially in the lower fornix. Follicular conjunctivitis manifests itself as inflamed folliculosis, with such symptoms as hyperemia and swelling. In some cases the differential diagnosis is very difficult.

Some ophthalmic surgeons in Japan are of the opinion that follicular conjunctivitis is an atypical trachoma determined by such factors as, for example, bodily resistance, mode of living, or virulence of the trachoma-causing organisms, and so forth. Folliculosis and follicular conjunctivitis are closely related.

In these districts where trachoma is prevalent, folliculosis and follicular conjunctivitis are rather scarce. In other districts where trachoma is not so frequently encountered, these two are seen more often. I investigated the correlation of trachoma with folliculosis, comparing their indices among school children in Kyobashi Ward (table 3). The coefficient of correlation was calculated as: $r = -0.52 \pm 0.80$. There existed a negative correlation between trachoma and folliculosis; that is, the more trachoma, the less folliculosis. In Japan the index of trachoma, in general, increases according to age up to some constant of the adult in that district, while on the other hand folliculosis tends to decrease during the school-age period. In this investigation, I disregarded the influence of age difference ranging from 7 to 12. Therefore it cannot be concluded that there exists definitely a negative correlation between these two. However, almost no folliculosis or conjunctivitis were found in the trachoma district, even among the younger school children in a rural elementary school of Akita prefecture.

Prognosis of trachoma and other conjunctivitis: Treatment of trachoma is especially effective while it is in the initial stage; hence, in order to combat trachoma successfully, it is necessary to detect the condition in its initial stage and to carry out the treatment.

It is very interesting to follow up the progress of initial trachoma and the prognosis of other conjunctivitides; for example, follicular conjunctivitis, chronic conjunctivitis, and even folliculosis. Table 5 shows the progress or retrogression of the disease in cases of follicular conjunctivitis and folliculosis. The second examination was made six months after the previous one. These examinations were carried out in two localities in Kyobashi Ward, in one of which trachoma was more prevalent than in the other.

Conjunctival abnormalities were classified in the following order: folliculosis, chronic conjunctivitis, follicular conjunctivitis, suspicious trachoma, trachoma.

Chronic conjunctivitis was categorically placed between folliculosis and follicular conjunctivitis. Among several stages of trachoma, stage II is deemed as the severest and a transition from stage I to stage III is considered as improvement.

Table 4 shows the progress of several conjunctivitis (including trachoma) cases.

(1) The number of cases of complete healing and those showing regression were about the same in reference to the trachomatous district and the nontrachomatous district. In the nontrachomatous district 50 percent remained unimproved as against 37 percent in the trachomatous district, while almost three times as many showed improvement in the latter district.

(2) Folliculosis and chronic conjunctivitis did not show much difference in degree of progress or retrogression of the disease in reference to the two localities.

TABLE 4

PROGRESS OF SEVERAL CONJUNCTIVITIS AND TRACHOMA CASES

	Trachoma locality					*Nontrachoma locality*				
	Healed	Improved	Unimproved	Worse	Total	Healed	Improved	Unimproved	Worse	Total
Folliculosis	25 (25.3%)	0 (0%)	29 (29.3%)	45 (45.4%)	99	32 (22.7%)	0 (0%)	53 (37.6%)	56 (39.7%)	141
Conjunctivitis	60 (21.1%)	3 (1.1%)	176 (62.0%)	45 (15.8%)	284	32 (18.4%)	3 (1.7%)	111 (63.8%)	28 (16.1%)	174
Follicular conjunctivitis	26 (16.9%)	56 (36.4%)	25 (16.2%)	47 (30.5%)	154	8 (15.6%)	17 (33.3%)	22 (43.1%)	4 (7.8%)	51
Suspicious trachoma	11 (7.3%)	66 (43.7%)	38 (25.2%)	36 (23.8%)	151	0	3	6	6	15
Trachoma	12 (6.2%)	113 (58.0%)	58 (29.9%)	11 (5.7%)	194	1	12	13	0	26
Total	134 (15.2%)	238 (26.9%)	184 (37.0%)	326 (20.9%)	882	73 (17.9%)	35 (8.6%)	205 (50.4%)	94 (23.1%)	407

(3) Trachoma showed improvement of symptoms and healing even in such a short period.

In table 5 are given the results from checking cases of folliculosis and follicular conjunctivitis especially. From this table, their progress can be seen more in detail. In the trachomatous locality, many more cases became trachomatous from follicular conjunctivitis and folliculosis than in the other.

Investigation of Prowazek-Halberstaedter bodies; their etiological significance: There have been many investigations of the Prowazek bodies in trachoma, and recently in Japan several reports have been published on this subject. To mention some of them, Shimizu and Aoki[1] by experimental inoculation into the human conjunctiva demonstrated this body as a significant causal factor in trachoma. It has been said that these bodies are rarely found in the chronic stage, but Okamura[2] quite recently found them in 62 percent of the chronically trachomatous eyes he examined. Tamiya, Hazato, and their colleagues[3] proved that Prowazek-Halberstaedter bodies developed and multiplied in the tissue culture of trachomatous conjunctiva. On the other hand, Oguchi and Majima[4] reported none in 138 typical cases of trachoma, and denied the etio-

TABLE 5

PROGRESS OF FOLLICULOSIS AND FOLLICULAR CONJUNCTIVITIS

	Trachoma locality				*Nontrachoma locality*			
Initial Condition / Result of Examination	Folliculosis		Follicular Conjunctivitis		Folliculosis		Follicular Conjunctivitis	
		percent		percent		percent		percent
Folliculosis	29	29.3	4	2.6	53	37.6	8	15.6
Conjunctivitis	27	27.3	52	33.8	30	21.3	9	17.7
Folicular conjunctivitis	2	2.0	25	16.2	14	9.9	22	43.1
Suspicious tr.	7	16.2	31	30.5	8	8.5	3	7.8
Trachoma	9		16		4		1	
Healed	25	25.3	26	16.9	32	22.7	8	15.6
Total	99		154		141		51	

logical significance of these bodies in trachoma.

My positive results were not so high as those of Okamura. My method is the usual one, taking epithelial cells with thin cover glass by gently scraping the conjunctiva of the fornix, fixing in methyl alcohol, and staining with the usual dilution of Giemsa's solution.

Using MacCallan's classification inclusion bodies were found more often in Stage II with active pannus than in any other stage. Even in very old cases with much scar tissue, these bodies were found rather easily, when pannus was severely inflamed, as was reported by M. Shimizu.[5]

If the presence of inclusion bodies has etiological significance, microscopical findings would indicate that this phenomenon coincides with the exacerbation of trachoma. In the Prowazek organism there are subdivisions such as elementary body, initial body, and others. That the initial body is one stage in the life cycle of the development of inclusion bodies, is accepted by some investigators. On the other hand, Shimizu[1] and Okamura[2] suggested that the most important factor is the elementary body, which is most frequently observed and which, moreover, manifests itself in several stages of development. Sometimes this body appears as a tiny conglomeration attached tightly to the nucleus of the epithelial cell, sometimes shrouding it like a cloak (chlamydozoa), and in some cases, it appears in the protoplasm, pressing the nucleus to one side and even rupturing the cell membrane, some of the tiny particles being freed extracellularly.

The result of my experiments did not indicate much difference between the appearance of the elementary body and the initial body.

It is generally thought that inclusion bodies may play an important role as an etiological factor, but it is difficult with the usual technique to identify them in a high percentage of cases, especially in milder cases. However, systematic study of the disease might well include examination for Prowazek's organisms with every new patient attending trachoma clinics.

Bacteriological examination of conjunctival flora in trachoma cases: Many reports have been made as to the conjunctival flora of trachoma. MacCallan stated in his book that in Egypt there were many complications of trachoma; such as, acute conjunctivitis due to Koch-Week's bacilli, Morax-Axenfeld's bacilli, gonococci, and others.

In districts where trachoma is endemic, acute conjunctivitis may occur superimposed upon a chronic trachomatous process. In the severe inflammation of an acute conjunctivitis, the milder symptoms of trachoma are covered, and may not be recognized as trachomatous. On the other hand, trachoma may develop on a basis of acute conjunctivitis. Therefore, the bacteriological examination of conjunctival flora in trachoma cases is important.

The method above described for use in detecting the Prowazek organism is advisable here rather than the usual method that includes a series of procedures such as taking material with a platinum loop, fixation on the flame, and staining with the usual pigment. Although Koch-Week's and Morax-Axenfeld's bacilli are easily stainable with the latter, the above method is effective in detecing any organism, including the Prowazek bodies.

Treatment of trachoma with special references to public health administration: The treatment of trachoma may be classified as follows:

(1) Pharmacological method: application of several concentrations of $AgNo_3$, $CuSo_4$, $ZnSo_4$ solutions, and so on.

(2) Physical method: cleansing and mechanical stimulation, with glass rod,

cotton attached to the glass rod, trachoma forceps, and so forth.

(3) Operative method: Scarification, scratching, cauterization, expression, tarsectomy, and so on.

The stage of trachoma development or the existence of such complications as pannus or corneal ulcer indicates the method of treatment.

In countries where trachoma is endemic, there are numerous destitute trachoma patients who must be treated by public-health agencies. Hospitals alone are not sufficient to carry out a national and communal campaign of trachoma eradication. In such institutions in trachoma countries, there is usually to be found a long queue of patients every day with a few eye specialists, full-time or half-time, treating several hundred patients. In the northeastern part of Japan where trachoma is prevalent in the rural districts very few eye specialists are to be found.

Such being the case, mass treatment must be taken into consideration. It is not always adequate with each patient in a long queue, to wash out the eyes and to instil drops. A simple operation or mechanical stimulation by the specialist, combined with daily irrigation by an assistant or home treatment, is one of the good methods available. Scratching, scarification,* or massage are methods that may be used by the specialist.

Such a method, with specialists, assistants, and nurses coöperating, may be very effective.

From a standpoint of public-health administration, antitrachoma education and the early detection and treatment of the disease are essentials.

In order to find trachoma patients, eye examinations must be carried out often and carefully among as many suspicious groups as possible. The standard of classification of trachoma must be considered, MacCallan's classification being one of the good methods.

Severe cases with much discharge must be strictly supervised. On the other hand, old cases of trachoma with scarring may be of little danger to the public. In Japan, comprehensive eye examinations are systematically carried out in the following cases:

(1) Children of school age all over the country (ages 7-12 years).
(2) All youths of recruiting age (20 years).
(3) Employees of special professions which come in direct contact with the public, such as hairdressers, employees in restaurants, hotels and others, controlled by the Trachoma Prevention Law.
(4) National physical examination of all the people of the selected ages (1, 2, 4, 8, 12, 16, and 19 years). This is a new project of the National Welfare Ministry, at present in the experimental stage only. In 1938 our health center carried out examinations for all these age groups in Kyobashi Ward. The 1939 examinations were being carried out in another district. The Welfare Ministry hopes to have this plan made compulsory under the law.

* In Japan, scarification with the skin of a certain species of shark has been used for a long time. Recently its effect has been appreciated anew. This skin has tiny projections that are provided with divided points and grow densely on the surface. The points tend nearly in the same direction, making acute angles to the surface. The skin is attached to a tiny, thin celluloid paddle (Aoshima's pattern) or fixed to a metal paddle having a thin long neck, so as not to exert much pressure on the conjunctiva at the time of operation. Aoshima's pattern or the skin itself is sterilized in formalin-of-sublimate solution, not in boiling water, because the skin is damaged by wet heat. Under anesthesia, using the usual concentration of cocaine or pontocain solution, the sterilized instrument is brought into contact with the everted conjunctiva and pulled gently against the projecting points so as to produce numerous fine lines of scarifications. The retrotarsal fold must be exposed completely, often with the aid of Desmarre's retractor, in order to be everted doubly and scarified thoroughly. One disadvantage is that this skin cannot easily be sterilized. Moreover, it is not suitable for repeated use because it becomes defaced, but it can be used two or three times. In Japan, this skin can be obtained quite easily.

People belonging to these four categories must undergo compulsory eye examination. In the schools of higher grades, factories, department stores, prisons, and so on, eye examinations are also carried out periodically in connection with regular compulsory physical examinations.

The treatment itself is an interesting problem clinically considered. Treatment in the early stage presupposes the discovery of the onset of trachoma, which is largely a problem in public administration. Treatment of such early cases is not difficult. There is evidence that even washing the eyes with clean water may suffice to cure some early cases. During periodical eye examinations of school children I have also come across a number of cases definitely diagnosed as trachoma the previous year and apparently completely healed without treatment. Some showed scar tissue with evidence of definitely healed trachoma.

In rural districts, where trachoma prevails and no eye specialist can be found, some adequate method must be devised for mass treatment, especially in elementary schools. An official itinerant organization to treat trachoma patients is at work in some districts in Japan. They usually stay in one place for a period of a few months to one year, and remove to another place. In the cities, where well-equipped institutions to treat trachoma are available, some thorough coöperative measures to combat trachoma can be taken more easily.

For antitrachoma education, the usual methods may be effective; for example, posters, leaflets, pamphlets, cinemas, picture-stories, lectures. Every available means must be utilized in order to obtain the most efficient results. Antitrachoma education is chiefly aimed at the following points:

(1) Trachoma is a communicable disease with attending complications and sequelae.

(2) It affects visual acuity. Statistical data as to the causes of blindness are an effective part of antitrachoma education.*

Washing the eyes with plain clean water by the use of eye cups or some special apparatus is recommended or simply with the cupped palm of the hand. Besides, according to the general rule in infectious diseases, the hands must be washed often to prevent contagion. I always order school children of the trachoma districts to wash their hands with diluted lysol.

The Trachoma Prevention Law of Japan was first enacted in 1919; some of its provisions are as follows:

Every medical practitioner who diagnoses a case of trachoma must give proper instruction to the patient and the relatives as to disinfection and preventive measures, and the patient must undergo treatment; in the case of destitute persons the cost of treatment is provided. Administrative authorities are required (1) to examine the eye, and (2) to prohibit the trachoma patients from continuing certain occupations in which they come in direct contact with customers, and (3) to compel authorities and employers to take all necessary precautions to prevent the spread of contagion in schools, factories, hotels, and by hairdressers.

Under the law, persons employed as nurses, hairdressers, and so forth, who come into intimate contact with the public are licensed by the police and if found to be trachomatous are submitted to com-

* According to Official report, in 1931, blindness was due to

	Cases	*Percent*
Blennorrhea	11,227	14.72
Trachoma	8,603	11.28
General disease	8,202	10.76
Syphilis	7,840	10.28
Trauma	4,637	6.08
Others	35,751	
Total	76,260	

pulsory treatment until certified to be non-infective.

A Japanese semiofficial organization for the prevention of trachoma was created in 1916. This publishes a quarterly journal called "Trachoma," sends out lectures into provinces, distributes pamphlets dealing with trachoma prophylaxis, organizes a "Trachoma prevention day," prepares educative cinema films, and provides popular lectures.

Several decades ago the London County Council carried out an effective experiment isolating trachomatous school children from their homes and schools, and placing them in special institutions where adequate treatment was given while their school education was carried on. They were allowed to return to their homes and to the regular schools only when the disease was cured. This measure was so effective that nearly all of these institutions, to each of which hundreds of trachoma children had been assigned, were no longer used after a comparatively short period.

The problem of trachoma eradication can be solved by public-health administration even though its etiology is not entirely clear.

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[1] Shimizu. Acta Soc. Ophth. Jap., 1937, v. 41.
Aoki and Shimzu. Acta Soc. Ophth. Jap., 1937, Appendix to v. 41.
[2] Okamura. Acta Soc. Ophth. Jap., 1939, v. 43, no. 4.
[3] Tamiya, Hazato, et al. Nipponbyorigakkaikaishi, 1938, v. 28.
[4] Oguchi and Majima. Chuogankaiho, 1938, v. 30.
[5] Shimizu. Gankarinshoiho, 1939, v. 35, no. 7.
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NOTES, CASES, INSTRUMENTS

DEAFNESS AND RETINITIS PIGMENTOSA

GUERDAN HARDY, M.D.
Saint Louis

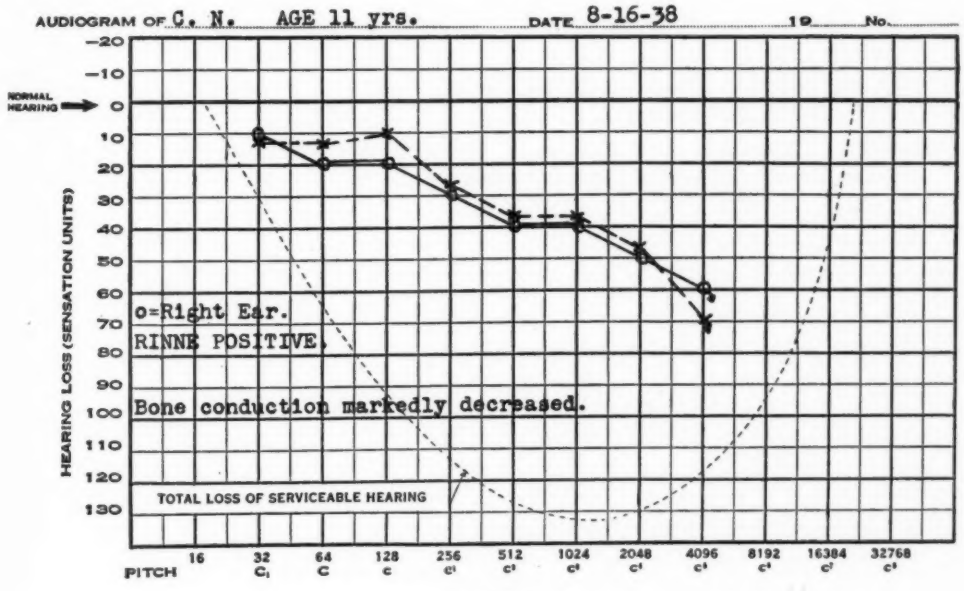
In August, 1938, a boy of 11 years was brought to me because of poor hearing. It had been observed that he was having difficulty in hearing his teacher at school. No note had been made at the time of any visual disturbance. There was no history that would suggest a preceding illness, infection, or injury as a cause of the deafness.

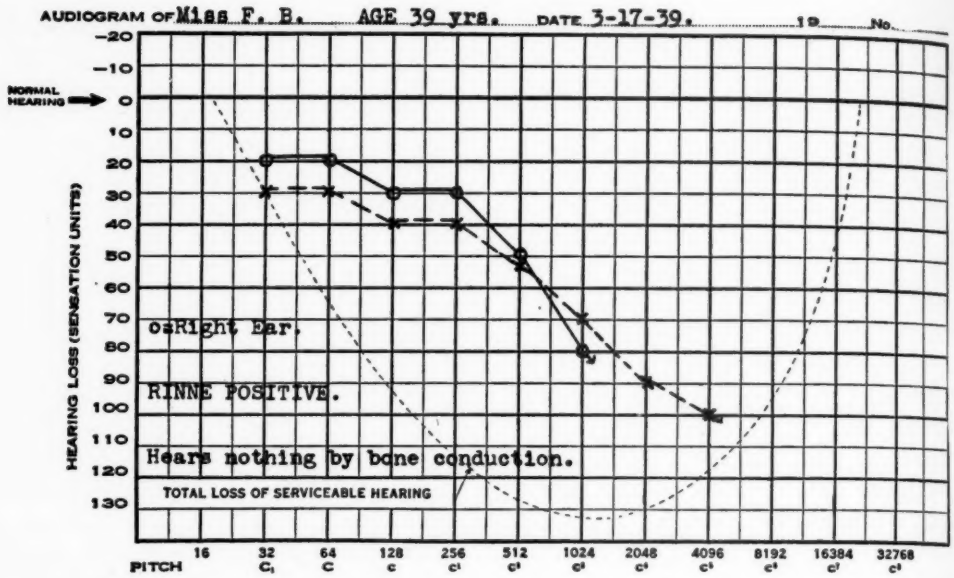
Physical examination was essentially negative except for the fundi. Following is the report from Dr. Alan Calhoun: "Right fundus. Slight pallor of the disc; no lamina cribrosa showing; margins distinct. The surrounding retina shows an almost complete loss of retinal pigment. There is no sclerosis of the choroidal vessels. The arteries are slightly attenuated. About midway to the periphery the retina is dotted with fine pigment, giving it a stippled appearance. The fundus does not resemble a 'salt-and-pepper fundus.' Farther toward the periphery are several beginning bone-corpuscle pigment deposits along the vessels. Here also are numerous yellow-white dots that seem to be situated deep in the outer retina or choroid. No areas of typical inflammatory pigment are noted. This strongly resembles an early case of retinosa pigmentosa. The fundus of the left eye is quite similar. The visual fields show concentric contraction of about 10 degrees but no ring scotoma."

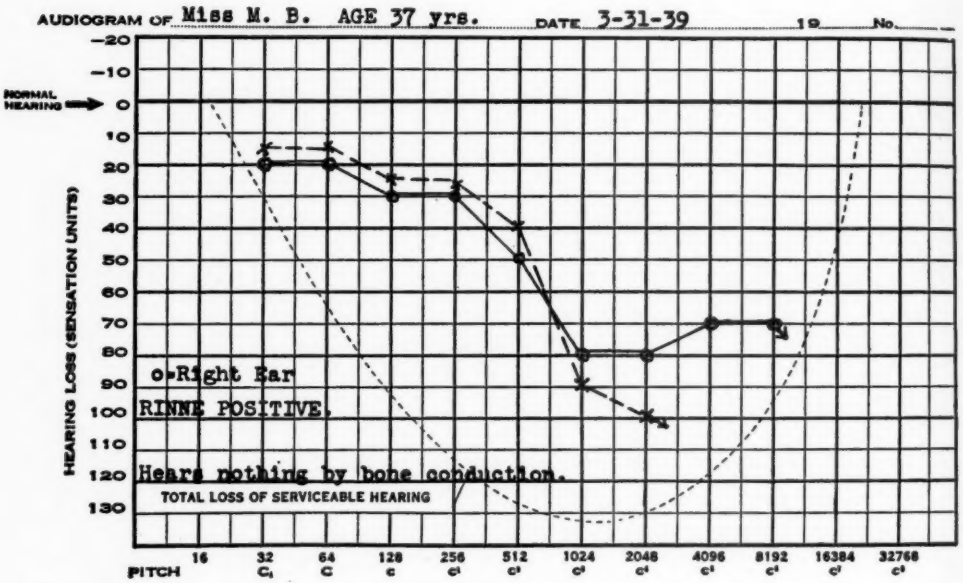
Refraction under cycloplegia: O.D. −1.00 D. sph. ⌯ +1.25 D. cyl. ax. 90°, vision 15/15; O.S. −0.50 D. sph. ⌯ +1.00 D. cyl. ax. 90°, vision 15/15.

The hearing was found to be diminished considerably: Right ear, whispered voice (loud) heard at 2 inches; spoken voice heard at 3 feet; Left ear, whispered voice heard at 2 inches; spoken voice heard at 2 feet.

The audiogram is particularly interest-







ing since it shows a progressive and steep loss as one passes from the low tones, through the middle, to the high tones.

The second audiogram shows the hearing loss of a woman, aged 39 years, who also has retinosa pigmentosa. This diagnosis was made by Dr. Wm. F. Hardy, Dr. J. A. Flury, and by the late Dr. E. Fuchs. Again one notes the progressive loss as the higher tones are approached until the highest are not heard at all.

The third audiogram shows the tone loss of a woman, aged 37 years, a sister of the previously mentioned patient. She likewise has retinosa pigmentosa.

To the best of my knowledge there have been no published audiograms of similar cases and for this reason this

chart is presented. Textbooks on the eye and on the ear merely mention the occurrence of an associated deafness.

Humboldt Building.

A NEW ULTRAVIOLET LAMP FOR CATARACT SURGERY

ELIOTT B. HAGUE, M.D.
Buffalo, New York

The spectrum visible to the human eye extends approximately from 7,000 angstrom units in the red to 4,000 in the violet. The ultraviolet spectrum covers a range comparably extensive. It has been conclusively shown that only the short-wave ultraviolet is biologically harmful. Well separated from the abiotic wave lengths, and just beyond the visible spectrum, there is a relatively narrow band of ultraviolet light which, if directed into the eye, will cause the lens to fluoresce.

In 1936 Hildreth devised a source of ultraviolet illumination constructed to visualize lenticular detail more distinctly than was previously possible, for use in cataract surgery. This lamp has been enthusiastically received by certain experienced operators. Care was taken in the design of the Hildreth instrument to achieve maximum results, optically, with the source of ultraviolet illumination then available.

In 1938 I suggested to Hildreth the possibility of utilizing a relatively new source of ultraviolet light, a new type of mercury-vapor lamp. Since that time I have worked out a method of ultraviolet illumination of the anterior segment and the lens, using a mercury-vapor lamp and filter chosen for transmission characteristics, availability, safety, and adaptability to manipulation.

Fig. 1 (Hague). New ultraviolet lamp for cataract surgery.

This lamp, which I have developed in coöperation with the Scientific Research Departments of the American Optical and Spencer Lens Companies, will soon be available for general use.

Basically it consists of a new mercury-vapor bulb manufactured by the General Electric Company and a filter selected by interpolating data concerning available

light sources and the transmission curves of certain glass filters at various thicknesses. Although the mercury-vapor lamp does not provide a spot source of illumination, practical concentration of the beam may be accomplished by a paraboloid reflector. The filter may be placed with equal efficiency as a shield encasing the bulb, or mounted in front of the reflector. Comparison of both types of filter mounting shows that the latter is superior only because a more compact unit is secured. The absorption characteristics of the filter in conjunction with the emission characteristics of the bulb give a band of ultraviolet light of maximum intensity at approximately 3,650 angstrom units. The intensity-distribution curve is such that the erythemal rays are reduced to a value well within the limits of safety. It has been mounted in a reflector made of material chosen for maximum ultraviolet reflectivity, and shaped to produce a most satisfactory beam. The cost of the complete equipment will be low. For collaboration, suggestions, and encouragement, I am indebted to Dr. F. Park Lewis, Dr. Francis B. Kellogg, Dr. H. Rommel Hildreth, Mr. E. H. Robinson of the General Electric Company, and to Mr. William Peck and Mr. R. J. Beitel, Jr., of the American Optical and the Spencer Lens Companies. Dr. John Glosser carried out experiments to confirm the wide margin of safety which this lamp exhibits.

This lamp possesses the following advantages: 1. *Safety.* Rays produced include practically the useful, nonharmful waves. Exposure of rabbits' eyes, human eyes, and human skin has completely confirmed this. Attention has been given to other safety factors in the design of the lamp. 2. *Convenience.* The lamp is light, compact, portable, easy to hold, and simple to manipulate. In comparison to a carbon arc, it gives a much more uniform and stable illumination. 3. *Efficiency.* The supply of fluorescing ultraviolet is greater than in previous lamps. More intense fluorescence is obtained. Illumination is sufficient to permit use of the lamp under general illumination.

The lamp may be used for the following purposes: 1. To identify cortical residue or remnants of capsule in extracapsular cataract extraction. 2. To visualize the anterior capsule of the lens in intracapsular extraction. 3. To locate dislocated lenses. 4. To recognize fine, superficial, corneal lesions stained with fluorescein, as has been suggested by Duke-Elder. 5. To detect slight lesions of the lid, more or less imperceptible by ordinary light. Duke-Elder states that these lesions may be demonstrated by giving the patient 2 grams of sodium fluorescein by mouth half an hour before examination. 6. Thiel (1925) has stated that ultraviolet light may be used to detect early cases of glaucoma. We are now investigating this possibility.

I have used this lamp successfully for a number of months and have come to feel that it is a necessary part of my operating equipment.

454 Franklin Street.

FOREIGN BODY IN BOTH ORBITS*

CARL T. EBER, M.D.
Saint Louis

Intraorbital foreign bodies are not uncommon. The following case, however, was unusual and was therefore considered worth reporting:

R. H., an unemployed Negro, aged 40 years, was admitted to the Homer Phillips Hospital eye clinic on July 12, 1938, complaining of failing sight. He stated that about a year previously, while intoxicated,

* Read before the Saint Louis Ophthalmic Society, March 25, 1938.

he was stabbed under the left eye with a pocket knife.

Examination made by the resident in ophthalmology, Dr. J. W. Nofels, revealed vision R.E. 20/70 — 1, L.E. 20/100, with marked limitation of rotation of the left globe in all directions except outward. A small scar was visible over the outer fourth of the lower rim of the left orbit. Ophthalmoscopic examination revealed partial primary atrophy of both optic nerves. A metallic object was palpable in the superior meati of the nose. Roentgenologic examination (fig. 1) showed the presence of a 6 cm. knife blade extending from the lower anterior quadrant of the left orbit, through the superior meati of the nose to almost the mid-portion of the right orbit, behind the nasal third of the eyeball.

On July 26, 1938, the patient entered the hospital and was admitted on the ophthalmologic service. Examination then revealed vision R.E. 29/200, L.E. 20/200, not improved with glasses. Visual fields showed concentric contraction of from 25 to 35 degrees. A McLean tonometer registered intraocular tension of 40 mm. Hg in the right eye and 42 mm. Hg in the left eye.

With the gaze of the right eye directed forward, the left eye was deviated outward about 25 degrees and upward about 8 degrees. Rotations of the left eyeball upward, downward, and nasally were practically nil. Rotations of the fellow eye were about normal in all directions.

The general physical findings were essentially normal. Urine, blood counts, and blood pressure were normal; a Kahn test was negative.

On August 2, 1938, under general anesthesia, an incision was made along the lower margin of the left orbit and dissection continued until the butt end of the knife was exposed and freed. Dr. W. A. Marmor of the oto-rhino-laryngologic department removed a part of the rim of the inferior orbital margin with Ronguer forceps in order to withdraw the blade from the orbit. Antitetanic serum was given before and after the operation.

The postoperative course was hectic after the fourth day. The patient's temperature ranged from 98.6°F. to 103.6°F. Considerable pus drained from the wound; Staphylococcus albus hemolyticus was obtained on culture. Prontylin and foreign-protein therapy were administered. By August 12, the patient's vision was 20/100 with each eye and the rotations of the left eyeball were markedly improved. The patient did not return for further observation.

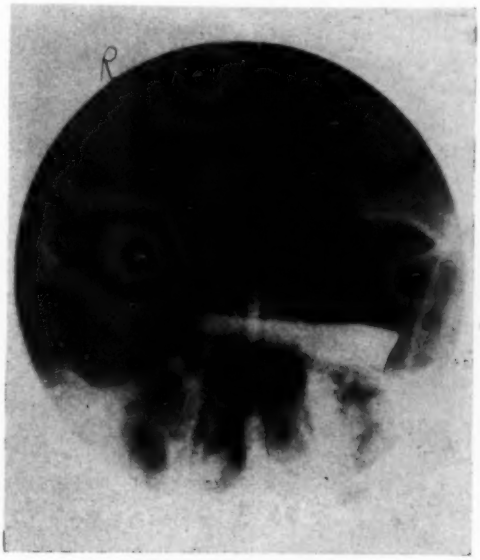


Fig. 1 (Eber). X-ray photograph showing position of knife blade.

J. Von der Hoeve* mentioned a similar case in which a knife blade completely severed all the eye nerves at the apex of the right orbit so that the right eye was blind, and motionless. The man was in-

* In "The eye and its diseases," edited by C. Berens, M.D., Philadelphia and London, W. B. Saunders Co., 1936, p. 798.

toxicated when stabbed and the diagnosis was made by roentgenogram two weeks later. The blade was 9 cm. long.

Carleton Building.

IMPROVED KINETIC TEST FOR BINOCULAR STEREOPSIS*

F. H. VERHOEFF, M.D.
Boston

Three years ago I described before this Society a new test which I designated a kinetic test for stereoscopic vision.[1] This I have found to be not only the most conclusive test available for determining binocular stereopsis, but also the least time consuming. For special purposes, for instance the testing of aviators, it could be calibrated so as to determine the minimum disparateness perceptible as depth, but for ordinary clinical purposes this is not necessary. The test may be adapted for use in an ordinary stereoscope, or in any type of amblyoscope. The contrivance for use in an ordinary stereoscope is not difficult to construct—the specifications are given in the communication referred to. For the benefit of those who for lack of time or for other reasons might be unable to make the contrivance, I submitted a model to several well-known manufacturers of optical instruments. Owing, presumably, to commercial considerations, none of them has yet made the contrivance generally available. Recently, a Boston optician** has succeeded in making, under my supervision, a satisfactory model that I shall now present to you. It incorporates one new feature, which I have added to my original model; namely, a means of moving the "ball" containing the hole.

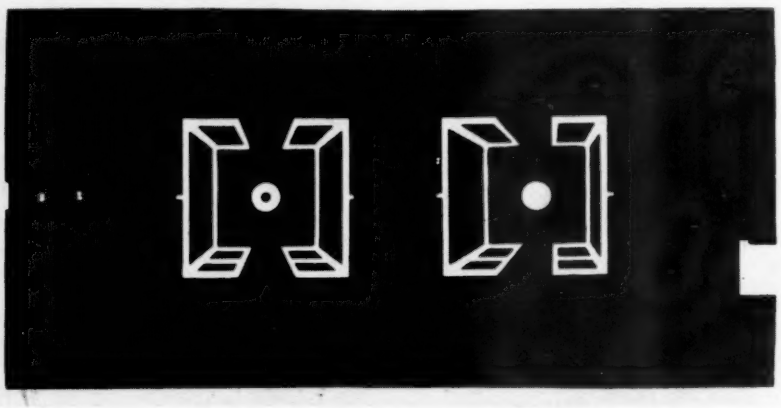


Fig. 1 (Verhoeff). Improved kinetic test for binocular stereopsis. About three fifths actual size.

In making the test, the contrivance is placed in the stereoscope so that the ball with the hole in it is before the left eye, and each ball so adjusted as to be in the center of the back of its box. Then the ball on the right is slowly moved inward and then outward. If with both eyes open the patient states that he sees a ball with a hole in it move, he has binocular fixa-

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* From the Howe Laboratory of Ophthalmology, Harvard University, and the Massachusetts Eye and Ear Infirmary. Read before the American Ophthalmological Society, Hot Springs, June 7, 1939.

** Mr. A. E. Covelle, prescription optician, 28 Park Square Building, Boston, Massachusetts.

tion. If he sees it move forward and backward in the box, and then with the left eye occluded he sees a solid ball move sidewise only, he possesses the function of binocular stereopsis. For additional evidence, the box on the right instead of the ball, is moved sidewise, and as a final check, the ball on the left is moved. Additional details regarding the test are given in my original communication. The contrivance may be obtained either with white figures on a black background, or with black figures on a white background. For general use, the white figures are preferable.

243 Charles Street.

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[1] Verhoeff, F. H. A kinetic test for stereoscopic vision. Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 127-141.

AN AID TO INDIRECT OPHTHALMOSCOPY OF THE PERIPHERY OF THE FUNDUS

HARRY S. GRADLE, M.D.
Chicago

In searching, by indirect ophthalmoscopy, the temporal periphery of the fundus for a hole, in cases of retinal detachment, the nose and overhanging eyebrows sometimes interfere with proper position of the condensing lens. So I cut away one third of the lens, as shown in the accompanying diagram, and now even the most aquiline nasal appendage offers no obstruction.

58 East Washington Street.

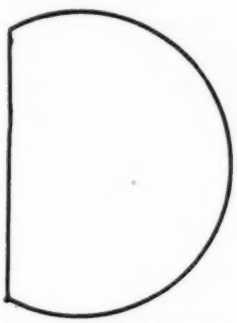

Fig. 1. (Gradle). Condensing lens to aid indirect ophthalmoscopy.

SOCIETY PROCEEDINGS

Edited by Dr. Rommel Hildreth

CHICAGO OPHTHALMOLOGICAL SOCIETY

February 20, 1939

Dr. Georgiana D. Theobald, *president*

Bilateral disciform macular degeneration

Dr. T. Van Bergen said that this man, aged 74 years, gave a history of having had failing vision in both eyes for the past two years, not improved by lenses. Vision was best in the periphery of the fields, and best in a dim light. The patient had had hypertension for the past 44 years. The family history was irrelevant.

Vision R. E. ability to count fingers at one foot: L. E. 1/200. There was a gray-white area surrounding each macula. The macula of the right eye was elevated and its center occupied by a reddish area about two disc diameters wide. Pigment in this region was uneven, mottled, and greenish in color. The macula of the left eye presented a similar appearance. Both fundi showed evidence of retinal angiosclerosis. The fields showed bilateral central scotomata.

Jensen's disease (neuroretinitis juxtapapillaris) with left central choroiditis.

Dr. Alfred Schultz presented a girl, aged 14 years, who first came under observation on November 30, 1937, with a complaint of poor vision in the left eye during the preceding week, and the statement that for three weeks objects viewed with this eye appeared green. The vision was R.E. 1.2—4, Jaeger 1; L.E. 0.2—41, Jaeger 7. There were no external findings of significance. The fundus showed a 2-diopter swelling of the disc of the right eye and 3-diopter swelling of the disc of the left eye. Adjoining the left temporal disc margin there was an ill-defined, round, greenish-gray, elevated lesion, 1 to 1.5 P.D. in size, at the center of which was a small hemorrhage. The retina about this area, including the macula, was stretched into edematous folds. The vessels were not tortuous, nor were other hemorrhages noted. Visual fields disclosed moderate concentric contraction for form and color of the left peripheral field and bilateral enlargement of the blind spots, the left being connected to a cecocentral scotoma six degrees in width. The refractive error was negligible.

The patient was hospitalized for 10 days, during which time the disease reached the height of its inflammatory stage, exudates appeared in both vascular funnels, and along the proximal course of the arteries. Vision was reduced to R.E. 0.8, L.E. 0.2, where it has remained. Complete physical examination and laboratory study revealed no pathology except for a low psychometric rating and chronic infected tonsils. The tonsils were enucleated; culture showed Streptococcus viridans hemolyticus and Staphylococcus aureus. Within four months the edema had largely subsided, leaving more marked pigmentary changes adjoining the superior pole of the disc of the right eye, and a one-third P.D. area of pigment degeneration and migration temporal to the disc of the left eye with a fairly well-defined lighter-red lesion encroaching upon the macula.

At present the disc margin of the right eye is slightly blurred, most marked nasalward, and the edema extends into the adjacent retina. The entire disc is surrounded by a dark halo, also most marked

superiorly nasalward. Adjacent and temporal to the disc of the left eye, the area of pigment degeneration and migration remains, with the discrete reddish surrounding lesion closely encroaching upon the macula. The fields show a bundle defect in the right and a pericecal scotoma in the left, corresponding to the retinal lesions. The refraction remains unchanged. The patient has no symptoms.

Several atypical features were noted: the great swelling collateral to the primary lesions which involve both discs and the macular region of the left eye and the bilateral nature of the condition.

Macular lesion of the right eye

Dr. Bertha Klien said that A. J., a Negro aged 38 years, was first seen in June, 1935, with complaint of poor vision in the right eye, first noted three weeks prior to this visit. The Wassermann test gave a four-plus reaction and he had been under antisyphilitic therapy for several months. Blood pressure was 185/118.

At that time the corrected vision R. E. was 18/200, no Jaeger; L. E. vision normal. In both fundi there was a third-degree retinal angiosclerosis with disseminated retinal hemorrhages. The macula of the right eye was surrounded by small groups of fatty infiltrates, and its center was occupied by a large accumulation of fatty material that was thought to be located mainly between the retina and choroid and that partly protruded through what appeared to be a hole in the macula. The deeper masses of fat were yellowish, ill defined, and within the level of the retina, while the protruding mass was white, fluffy, and rather prominent.

The patient was seen again in 1939, and is presented to demonstrate the difference in appearance of the macula of the right eye as compared with the findings in 1935. The corrected vision in the right eye is now 1.01, Jaeger 1. The only abnormal findings in the macula are a distorted foveolar reflex, and a very discrete gray, veillike opacity below it.

The original diagnosis of a hole in the macula must be modified and the findings of three years ago interpreted as an inner rupture of a paramacular cyst which left the neuroepithelium intact.

Bilateral primary optic atrophy: Leber's disease

Dr. P. D. Shanedling presented H. E., a white man, aged 28 years, who was first seen in the clinic on May 12, 1937. He gave a history of poor vision during almost his entire life. Vision has never been improved by glasses. There is no history of injury or contributing disease.

Vision R. E. 0.1; reads Snellen 1.00 at four inches. L. E. the same. External examination was essentially negative. Each disc showed marked temporal pallor, atrophic cupping, motheaten rim. The patient could not read Ishihara plates. The peripheral fields were full. Bjerrum fields showed right and left central scotoma.

With full correction and telescopic lenses, the patient could read 0.3 in each eye, and Snellen 1.25 at 10 inches.

One sister has similar fundus and field changes, but vision with average myopic correction is 0.3 in each eye. One sister and one brother had good vision in each eye.

Lawrence-Moon-Biedl syndrome

Dr. Mary Jane Fowler presented B. K., a girl aged 17 years, whose vision was R. E. 1/200; L. E. 1/200, not improved by glasses. There was divergent strabismus of 10 degrees in the right eye and rotatory and horizontal nystagmus. The fundi showed advanced retinitis pigmentosa and optic atrophy.

Physical and mental examination showed an I.Q. of 48. Basal metabolic test was —23. There was slightly increased glu-

cose tolerance, hypertrichosis, and obesity. The hearing was normal; menstrual history normal. Wassermann, Kahn, and spinal-fluid reactions were negative. Polydactylism, present at birth had been corrected at the age of six months.

One brother and one first cousin had a similar diagnosis. There was no history of consanguinity.

Familial corneal dystrophy, lattice type

Dr. James W. Marron presented a family of 10 members, with the following findings: the father, aged 62 years, gave a history of poor vision as long as he could remember. Vision 2/200 in each eye. The corneae were thickened with superficial vascularization; there were many lines and striations in the region of Bowman's membrane; the corneae were insensitive. Six of the eight children showed a similar dystrophy; the mother and two children had normal eyes.

The corneae presented irregular granular epithelium; many irregular linear and circular scratchlike opacities could be seen in each eye, largely in the region of Bowman's membrane and the anterior one third of the stroma. The fields were normal. Vision in each case was below normal. Laboratory examinations revealed no abnormalities.

Tapetoretinal degeneration

Dr. Paul Hurwitz said that the mother aged 33 years, had had poor vision at night since childhood. Two of her three children have the same difficulty. Her past history revealed nothing of significance.

Upon examination a cover divergence of 10 degrees was found, and there were spoke-shaped radiating posterior subcapsular opacities of both lenses. The disc margins were slightly blurred, the vessels attenuated. Diffusely spread through the fundi, extending from within the equatorial zones to the periphery, were many sharply pointed, speckled, and bone-corpuscle-shaped pigment deposits. There was a diffuse choroidal sclerosis. Vision with moderate compound hyperopic correction was approximately 20/40 in each eye.

The oldest son, aged 10 years, has complained of poor night vision for the past four years. Vision with low compound hyperopic correction, 20/20+, Jaeger 1 in each eye. The irides were blue, the lenses normal. The right fundus showed slight elevation of the disc margin. There were hyaloid remnants in both Cloquet canals. The arteries were attenuated, the equatorial regions albinotic, mottled with yellowish-white dots and many black pigment dots. There were vitreous floaters in both eyes, a large vitreous mass being attached to the posterior capsule of the lens of the left eye.

When this boy was first seen two years ago, the picture appeared to be one of retinitis punctata albescens, which has changed as the albinotic areas of the fundus have become greater and less covered with pigment.

The second boy, aged 7½ years, had difficulty with night vision. Central vision with moderately high compound hyperopic correction was R. E. 0.4; L. E. 0.2 There was a left concomitant convergent strabismus. The irides were brown. There was a diffuse, dark pigmentary disturbance with many yellowish-white areas and dustlike pigment granules scattered between. The discs were normal; the arteries attenuated.

The peripheral fields in all three cases showed a marked concentric contraction to within a few degrees of the point of fixation. The blood Wassermann in each case gave a negative reaction.

The surgery of exophthalmos

Dr. Daniel B. Kirby said that exophthalmos may be defined as a true propto-

sis caused by an increase in the tissue content of the orbit behind the eye. The definition may be extended to include those cases in which an apparent or real exophthalmos is enhanced by an overaction of the smooth muscles of the orbit causing retraction of the eyelids.

The particular reasons for selection of this subject by the author were: (1) The long-continued study and interest in a number of these cases; (2) the development of the technique for tenotomy, myotomy, and myectomy of the levator through the skin incision; (3) the application of theories regarding the mechanism of the development of the muscle, corneal, and orbital changes; (4) the appraisal of the techniques and procedures advanced by others.

Apparent exophthalmos is produced by complete detachment of the internal canthal ligament by trauma or in operations on the lacrimal sac and by complete tenotomy or by too free recession of one of the rectus muscles that may be considered as retractors of the eyeball. Care should be exercised in guarding against such an occurrence. Procedures for the correction of these conditions may be found difficult.

In the approach to tumors and cysts of the orbit, when these are in the inferior orbit, the simple skin and deep-fascia incision may be utilized. For the temporal portion of the orbit the Krönlein incision is too disfiguring. The transconjunctival incision, involving a free canthotomy and division of the lateral fascia of the orbit and the temporary tenotomy of the external rectus muscle, affords excellent access. The brow incision and the reflection of the periosteum from above, particularly superior temporally, may often be useful. The transfrontal approach through the roof of the orbit may well be used in deep orbital neoplasms. Access to neoplasms on the nasal side of the orbit offers the greatest difficulties. Deep cysts whether lined by epithelium or not need treatment with a caustic for their obliteration. During and after such operations the safety of the eye should be guarded by intermarginal lid sutures and by carefully adjusted graduated pressure dressing.

The principal subject discussed by Dr. Kirby was that of exophthalmos in thyroid disease. It occurs in about 50 percent of such cases. The eyes of all patients should be measured with the exophthalmometer to thus distinguish the apparent exophthalmos. Even the most astute observer may be deceived when the smooth muscle of the orbit is contracting excessively and retracting the lids over the globe.

After thyroidectomy, in about half of the patients said to have exophthalmos, the condition subsides entirely and receeds somewhat in about 20 percent more. In the others, it may remain stationary or it may progress to varying degrees, some very few going to the point of danger to the safety of the eyes and to the life of the patient (Naffziger).

Thyroid cases may show other disturbing eye conditions such as optic neuritis and papilledema, ocular muscle pareses and degenerations, and the distressing conditions attendant upon the exposure of the eye in exophthalmos, erosion, ulceration, perforation, and endophthalmitis.

Cases exhibiting only residual spasm of the levator and the smooth muscle of the orbit require recession or tenotomy or myotomy or myectomy of these muscles. This can be done either through the skin or through the conjunctiva. The author has cases in which this procedure was carried out with success by both routes. Were it not for some of the disagreeable effects of cervical sympathectomy, this might be done to remove the spasm of the smooth muscle.

Patients in whom the principal deformity is that of exposure of the temporal portion of the bulbus in a widened and much elongated palpebral fissure have

been frequently observed. In these the indication is for external canthoplasty. The Wheeler method, which preserves the acute angle of the external canthus while narrowing and shortening the fissure, is the most satisfactory. Results are favorable and pleasing if care is used not to narrow the fissure too much. By these two procedures much of the deformity and lack of protection of the globe due to exophthalmos of thyroid disease can be abated and the patient restored to comfort and safety and rehabilitated in his social and workaday life.

True exophthalmos has been demonstrated to be due to an increased bulk of the tissues of the orbit. The fat and other tissues are edematous and infiltrated by abnormal cells, the muscles may be several times their normal size, their function is interfered with, and diplopia and deviation of the globe are to be found. Anesthesia and dystrophy of the cornea, which is due to pressure on the sensory and trophic nerves, may have much to do with the rapid sloughing and ulceration in some cases. Smelser has succeeded in producing this picture of progressive exophthalmos of the human in the orbits of animals by first removing the thyroid and then injecting large amounts of the thyrotropic hormone of the anterior lobe of the pituitary gland. His work has been confirmed by Marine.

The cases that are apt to progress to the severe or malignant stage of protrusion are those which, according to Ruedemann, have undergone thyroidectomy for relief of certain symptoms of myasthenia gravis or neurocirculatory asthenia. L. Sloan and Kirby state that cases in which the exophthalmos is greatly out of proportion to the other symptoms and signs of hyperthyroidism, cases in which diplopia is present, cases in which there is, by palpation, a certain resistance or fixation of the orbital tissues, cases in which there is obesity or other evidence of pituitary or other glandular dysfunction, are to be carefully guarded if thyroidectomy is performed. The use of iodine prior to thyroidectomy and the use of thyroid extract governed by the basal metabolic rate after operation will help reduce the incidence of severe exophthalmos. Two cases are quoted in which after thyroidectomy, malignant exophthalmos developed leading to the loss of both eyes. Evisceration of the globe seems to be a more rational procedure in such conditions than enucleation because of the danger of infecting the meninges when the latter are cut in the procedure of enucleation.

A number of cases may be cited in which the indications were for decompression of the orbits because of the apparent danger to the safety of the globe. The prognostic signs of value seemed to be: (1) Fixation and resistance and density of the tissues of the orbit as determined by palpation or by X ray. (2) Erosion or sloughing or ulceration of the cornea. (3) Anesthesia of the cornea or surrounding tissues. (4) Marked extrinsic ocular-muscle involvement. (5) Papilledema or optic neuritis. (6) Marked edema of the conjunctiva and lids.

The surgical procedures that have been of value are: (1) Emergency canthotomy with section of the temporal orbital fascias. (2) Temporary lid sutures or adhesions which unfortunately break down if the pressure is progressing behind them. (3) Canthoplasty. (4) Drainage of the orbit. (5) Incision through skin and orbital fascia below for removal of edematous orbital fat. (6) Krönlein operation which, even though deforming, decompresses the orbit into the soft tissues. (7) The superior temporal approach to the orbit and subdural space. (8) The Naffziger procedure of removing the roof of the orbit by the transfrontal route. (9) The decompression of the orbit into the

sinuses as advised by Sewall and carried out by Kistner.

X-ray therapy of the deep orbit and also of the pituitary has been used.

The series of successful results reported by Naffziger have been most encouraging. Over a period of six years with an increasing number of patients the principle and method have been tested and by their use various surgeons have successfully stopped the progress of certain malignant cases of exophthalmos. Naffziger's recent report shows that the success obtained early in his cases has stood the test of time.

General systemic treatment and careful nursing are necessary adjuncts to the success of the surgery. Warning is to be made against the invasion of the orbit in improper exploration for tumor when none exists in such cases of malignant exophthalmos and of that peculiar chronic inflammatory reaction of the orbit known as pseudotumor.

Central angiospastic retinopathy

Dr. Sanford Gifford and Dr. Gilbert Marquardt reported on a type of retinopathy which affects young or middle-aged adults, chiefly men, showing no generalized hypertension. It is seen almost exclusively when it affects the macular region and is characterized by symptoms and fundus changes best explained as the result of spastic contraction of the smaller retinal arterioles or capillaries supplying this region. From their study it was concluded that there was no doubt as to the circulatory origin of the conditions described. The transient nature of the attacks with complete or almost complete recovery of function; the frequency of recurrence; the ophthalmoscopic evidence of edema during the acute attacks with slight atrophic changes afterward; the predominant involvement of the macular area with its peculiarly vulnerable blood supply; the absence of congestion, precipitates, or vitreous opacities, all suggested a circulatory disturbance rather than any form of inflammation.

Treatment was directed toward securing vasodilation through relief of angiospasm. Instruction as to hygiene and habits was given. Tobacco was forbidden. Emphasis was placed on avoidance of exposure to cold, and freedom from emotional upset. Various medications were described, and the results obtained were discussed. Emphasis was also placed on the importance of a normal metabolic rate. Some medication, especially rational regulation of hygiene and habits, must be continued for some time, the need for treatment being determined by repeated examinations of the peripheral circulation.

Discussion. Dr. Gilbert Marquardt said that the signs of angiospasm were the same regardless of the underlying pathology; primarily, coldness and pallor of the extremities. All patients gave a history of having had this for many years out of proportion to the atmospheric temperature. Elevating the hands caused excessive pallor and they became rubescent when lowered. The normal degree of spasm in the extremities was probably about 1.5 degrees. Any type of anesthesia, local or general, which would release the spasm, resulted in an astounding elevation in temperature, as high as 4, 6, 8, or 12 degrees. That meant that the neurogenic factor was primary. To release it permanently it was necessary to use drugs and avoid exposure to cold. In no case was surgery necessary.

In the pathologic picture the spasm in the capillaries was most striking. The larger vessels were not so much affected. The erythrocytes have to roll up before they could pass through the loop; there is diminution in the number of capillaries visible in the field; instead of 15 or 20

there are 5, 6, or 8. When the results were good, the normal balance was restored.

The incidence of spasm is not confined to the functional group alone, but is also present in the sclerotic arteries. It can occur with even very advanced arteriosclerosis, and much can be accomplished by release of the spasm. If the cuticle of the nails is not pushed back, an excellent view can be obtained of the capillaries, and this may be correlated with other findings.

Dr. E. V. L. Brown said he had seen one case that resembled one in the series discussed, in which there was a definite bulging of the macular area with hemorrhage. The vision was reduced to .1 or less. As the ocular involvement cleared up with treatment for the physical condition, useful vision was restored, to about .8. This patient was about 23 years of age.

Dr. Thomas D. Allen remarked that Dr. Marquardt had mentioned that if the patient were not watched there was a tendency toward recurrence.

Dr. Frank Brawley asked whether any form of vacuum treatment, such as is used in Buerger's disease, had been considered.

Dr. Sanford Gifford (closing), in answer to Dr. Brawley, replied that it would hardly be possible to apply suction to the eyeball as it would be to the leg. If a paracentesis is performed, the pressure in the eye is lowered, and that is beneficial. Capillary study was done as part of the general examination. The temperature of the extremities was compared with the general body temperature.

Dr. Marquardt referred to the blocking of the posterior tibial nerve. When this was done in one case there was a rise of 12 degrees in temperature. Smoking a cigarette will cause the temperature to drop four to six degrees; most patients were smokers. It is thought, therefore, that nicotine is a factor in producing spasm. The condition is more frequent than is generally supposed. Horniker collected 42 cases in Trieste in 10 years, and the series discussed this evening, 10 cases, was collected in a year and a half. The condition would probably be seen more frequently if attention were directed to the peripheral circulation, which is not usually done in routine examination. There was no rise in blood pressure; 130 was the highest recorded. The change was in the peripheral circulation.

Robert von der Heydt.

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on Ophthalmology

February 16, 1939

Dr. Alexander G. Fewell, *chairman*

An additional report on vernal conjunctivitis

Dr. Louis Lehrfeld recited the development of his experiments on vernal conjunctivitis as first reported to this Section on November 20, 1924. He reviewed the theories concerning the etiology of this disease that were recognized at that time, pointing out that many authorities claim the relationship between vernal conjunctivitis with trachoma, measles, lues, nasopharyngeal diseases, autointoxication, eczema, rickets, hay fever, and asthma. Among the predisposing causes commonly mentioned in the literature were climate, humidity, heredity, sex, and age.

He referred to his first experiments, which were conducted at the Wills Hospital and aimed to point out that vernal conjunctivitis is an ocular manifestation of an allergy. A report of five cases showing sensitivity to pollens of trees, grasses, weeds, and foods was made in 1924. The report presented at this time concerned

120 cases in which a very high percentage of positive allergic reactions was obtained, both by skin tests and by the ophthalmic tests, the latter being performed during the winter season when the patients were free from symptoms of vernal conjunctivitis. A statistical report was made pointing out a hereditary history in about 40 percent of instances and the importance of the ophthalmic test in eliciting the high percentage of positive reactions.

He reviewed the clinico-pathological manifestations of the disease, stating that the commmonly known cobblestone or pavement-epithelium type was the rarest of all forms of vernal conjunctivitis, and announced the efficiency of sodium carbonate monohydratus, when used in a 5-percent solution of alcohol. The alcohol content was not sufficient to cause irritation of the eye, but served to intensify the solvent action of sodium carbonate monohydratus upon the mucus present in the eye.

Discussion. Dr. Louis Tuft said that while there is little doubt as to the allergic character of vernal conjunctivitis we cannot accept it as truly atopic, at least not in the same sense as is true of hay fever or asthma. In the latter disease the hereditary factor is more definite and appears in higher percentages of cases. The skin tests are etiologically more specific and correspond more definitely to the patient's clinical condition, and specific allergic antibodies or reagins can be found in the blood of the patient. This is not true as yet of vernal conjunctivitis.

The only drawback to accepting vernal conjunctivitis as truly atopic concerns the determination of its specific etiology. It is true that skin and eye tests are positive to pollens or other inhalants, but this is not enough to account for symptoms, since the symptomatology of vernal conjunctivitis extending, as it does, from spring throughout summer does not conform to the pollination period of any one particular plant as in hay fever, nor even truly to that of several plants. In hay fever, most patients are sensitive to one group of pollens confined to one period and do not continue sensitivity throughout several periods. Even in patients who are sensitive to such inhalants as dust, orris, and tobacco, and who have conjunctivitis, the condition is not of the vernal type, and clinical verification of the positive skin tests can be obtained.

Because of this uncertainty in regard to etiology, it occurred to Dr. Tuft that possibly in vernal conjunctivitis there existed a sensitivity not to the aqueous fraction of the pollen (fraction responsible for hay fever) but to the oily fraction (fraction responsible for pollen dermatitis) and that vernal conjunctivitis resulted from contact with the oily fraction in sensitive individuals. This likewise might account for the prolonged action over a longer period of time. Dr. Tuft suggested to Dr. Lehrfeld that tests with the oily fraction both by the patch method and in the eye be included in their study. The patch tests proved to be negative and the pollen oil was found to be too irritating to the eye for satisfactory study; hence no evidence of sensitivity to pollen oil was obtained in the investigation reported by Drs. Lehrfeld and Miller.

Other suggestions as to etiology include the possibility of sensitivity to molds and also the possibility of bacterial sensitivity, the latter being suggested by Dr. Cooke. These views are theoretical and still await experimental confirmation. It is apparent, therefore, that, although sufficient evidence has been presented to warrant the conclusion that vernal conjunctivitis is allergic, its etiology is undetermined. We are possibly in the same position with regard to vernal conjunctivitis as to certain cases of allergic rhinitis—many of these have seasonal symptoms and are

recognized as instances of hay fever the etiology of which is determinable; others have perennial symptoms and here again the cause is either sensitivity to inhalants or to foods; finally, there is a small but definite group of patients who have symptoms of allergic rhinitis that begin in the fall and last throughout the winter and spring and clear up in warm weather. These patients also give positive skin reactions to various allergens, but none of these is specific, and treatment by allergic methods is not followed by improvement. It is possible that these are examples of what Duke has called physical allergy or sensitivity to physical agents. Possibly vernal conjunctivitis also represents a similar type of conjunctivitis that lies between that of hay fever on the one hand and perennial allergic conjunctivitis due to dust or other inhalants on the other. It might be well to emphasize in conclusion that patients with vernal conjunctivitis should be treated by allergic methods in order to determine whether they respond to such treatment in the same way as do other allergic patients.

Dr. Jerome Miller said we have presented presumptive evidence that indicates that vernal conjunctivitis in many ways resembles other allergic diseases. This is manifested by the seasonal incidence; the eosinophilia in the blood and ocular discharge; the positive intradermal and ophthalmic reactions to the various allergens and pollens; and the symptomatic relief afforded patients by the use of epinephrine solution.

While vernal conjunctivitis is not an atopic disease in the sense that hay fever and asthma are, it is subject to the influence of heredity. We have shown that heredity plays an important part in this disease and that the age factor corresponds to the age incidence of other atopic states. Vernal conjunctivitis in our series was shown to exist in the same family and also in members of families where other atopic diseases were present.

Having definitely established the fact that vernal conjunctivitis is an allergic disease, our future work will be directed to determine the specific allergen or allergens in question, and any other factor, whether specific or secondary, that may cause a prolongation of symptoms.

Some considerations in the management of hypermetropia

Dr. Alfred Cowan read a paper on this subject which has been published in this Journal (September, 1939).

A case of extensive ulceration of the cornea cleared by desiccation peritomy

Dr. Van M. Ellis presented the case of a woman, aged 66 years, who was first seen in April, 1938, complaining of lacrimation, photophobia, pain, and ability to see only large objects with the right eye. Seven years ago she had occasional pain in the right eye, and sensitivity to light, also blurry vision at a distance. She consulted an optometrist who had prescribed lenses for her in the past. Tearing and cloudy vision became progressively worse. For the past four or five years she has been unable to see anything distinctly with the right eye.

The lids of the right eye were swollen, and there was much redness around the skin of the orbit. The palpebral conjunctiva was much inflamed. There was an abundance of new vessels running across the limbus to the stroma of the cornea in its entire circumference. The cornea was bedewed and completely hazed throughout. There was superficial staining. Slit-lamp examination revealed a thickened cornea with many deep folds in Descemet's membrane. The anterior chamber appeared to be of normal depth, the pupillary reaction normal; the iris could not be

clearly seen. Vision was the ability to see hand movements. The left eye appeared to be normal, with vision of 6/6.

A general check up, including Mantoux, Wassermann, and blood-sugar tests, also dental, nose, and throat examinations, was entirely negative. Treatment was a high-vitamin diet, salicylates, dionin, hot compresses, and silver nitrate, 1 percent, to the lids. This treatment was continued without any apparent improvement.

On September 9th a desiccation peritomy was performed, after which the vision began slowly to improve. In one month vision improved to 6/15 and bedewing and general appearance of the cornea changed considerably. On October 17, 1938, many of the vessels that had been missed in the first desiccation were touched individually.

During the following three months the cornea continued to clear, and the vision gradually improved.

On January 31, 1939, several small, fine, remaining vessels were desiccated. Vision on February 15th, in the right eye with a + .25 D.sph. ⊂⊃ − .75 D.cyl. ax. 170° was 6/9.

Discussion. Dr. H. Maxwell Langdon said that when some of us were younger, there was much immigration, and cases of trachoma eluded medical inspection, peritomy for the vascularity of the cornea was a frequent proceeding. Trachoma is now an infrequent occurrence and peritomy has fallen into disuse, but for a vascular corneal ulcer it is most helpful and there is nothing that will so greatly help corneal scarring and improve the vision as removal of the vascularity.

Three cases of Argyll Robertson pupil apparently non-luetic

Dr. H. Maxwell Langdon said his case was that of a man, 59 years old. He had small unequal pupils that would contract to accommodation but not to light and that would not dilate well with atropine. The optic nerve was atrophic. The miosis was the feature of main interest to him in this case. He believed it to be due to weakness of the sympathetic dilating fibers from the spinal cord.

In 1924, in the Transactions of the Ophthalmological Society of the United Kingdom, R. Foster Moore reported seven cases of "Non-luetic Argyll Robertson pupils" and in the same publication, in 1931, added eight more, making fifteen in all.

The characteristic change in the pupils in this series was a complete loss of contraction to light; but there was response to accommodation-convergence, very slow both in contraction and dilation. Accommodation was not affected; there was full dilation with atropine and contraction with eserine; and the condition was unilateral in 13 cases out of 15 reported, the affected pupil usually being larger than the normal one. Twelve of the 15 patients were females and the age of recognized onset was between birth and 42 years.

No changes were found in any other ocular structure nor in the central nervous system, and in no case could a connection be found with syphilis either acquired or congenital.

In the British Medical Journal in May, 1931, Adie reported six cases of pseudo-Argyll Robertson pupils of the type that Foster Moore had already reported. Two of his cases had been referred to him by Moore and had been apparently included in Moore's cases.

The following three cases seem to be of the type described by Moore and Adie but more representative of the ordinary manifestations of pupillary change in posterior-cord disease. One, however, has been under observation for 13 years, with no general manifestations whatsoever, another for 14; while it must be admitted that the third has been only recently ob-

served and there are no general symptoms or serological findings to justify a diagnosis of neuro-syphilis.

Mr. M. P. B., aged 52 years, was seen on June 17, 1926, through the kindness of Dr. Malcolm Councill. It had been noticed about two weeks before that the pupils were unequal and did not respond to light. The patient was in good health in every way and Dr. Councill could find no neurologic symptoms. Examination showed that with a low hyperopia corrected the vision was 5/4 in each eye, and the near point with a +2 D. sph. was correct for his age. The pupil of the right eye was 3.5 mm. in diameter and of the left 5 mm., with no response to light and a rather slight reaction to accommodation. The accommodative impulse, however, was still present. The ocular rotations were full with no diplopia. The media were clear, the discs normal in color with some increase of light-streak of the retinal arteries, but no other fundus changes. The patient refused to have any serological examinations made. He is still in perfect health but the pupils are as described. No attempt was made to dilate the pupils with mydriatics.

On May 13, 1935, M. W. W. L., aged 35 years, was examined, complaining of some trouble for near work. He had no headache and no other ocular symptoms. The vision of the right eye was 5/6 plus with a near point of 21 centimeters; the vision of the left eye was 5/5 plus with a near point of 19 centimeters. The pupil of the right eye was 4 mm. in size, irregular in outline, and did not respond even to concentrated light. The pupil of the left eye measured 3 mm., was irregular in outline, and responded slightly and slowly to diffused light. Both responded well to the accommodation-convergence stimulation. The motions were normal with no diplopia, the visual fields normal for form and color, the media clear, and there were no fundus changes. The blood Wassermann test was negative. He refused a spinal-fluid examination. He has been seen within six months and seems to be in perfectly good health. As far as he knows, there is nothing the matter with him in any way. The pupils are still the same. No attempt was made to dilate the pupils with mydriatics.

On November 5, 1938, Miss E. A. M. was seen through the kindness of Dr. W. E. Robertson. She gave a history of having had some trouble in using her eyes, and Dr. Robertson had noticed that the pupils did not react well to light. Her eyes felt strained for near work and she had occasional headaches. Vision was 5/4 both with and without glasses. Her near point was 18 centimeters. The pupil of the right eye was 3.5 mm. in diameter, and of the left, 3 mm. The pupils were irregular in outline with no reactions to even concentrated light, but they responded moderately well to accommodative convergence. The pupils dilated very poorly with homatropine. The media were clear, the discs normal in color and outline, with no fundus changes. The visual fields were normal for form and color, and there was no diplopia. Dr. Robertson was unable to find any clinical signs that would justify a diagnosis of central-nervous-system disease, except for slightly sluggish knee-jerks. The blood Meinicke and Wassermann tests were both negative. The spinal fluid was perfectly clear, colloidal gold, 10 ciphers, globulin negative.

Discussion. Dr. Francis Heed Adler said he believed these patients fitted into Adie's syndrome group rather than into the group of true Argyll Robertson pupils. The pupils were not miotic, and at least one case definitely showed tonic reactions.

Warren S. Reese,
Clerk.

AMERICAN JOURNAL OF OPHTHALMOLOGY

Published Monthly by the Ophthalmic Publishing Company

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POPULAR ARTICLES ON OPHTHALMOLOGY

In the December 18, 1939, issue of Life, on page 28 and the succeeding pages, there appeared a good article on "The eye," profusely illustrated. The subject matter and pictures are presented particularly to create interest in the topic under discussion. They follow the usual method of current magazines in selecting the dramatic, because the essential factor from the magazine point of view is readability, and in this particular publication photography is the primary lure.

The script includes some of the anatomy and physiology of the eye, the substance of which is essentially correct, and, although it is hard always to appreciate the point of view of laymen, it would appear to be informative to them. An ophthalmologist would probably not have presented it in just the form in which it is shown equally, because it stresses the unusual and tends to pass over the less dramatic but equally important ocular facts. For example, there is a beautiful illustration of a cloudy cornea, and next to it a cornea with a corneal transplant *in situ,* presumably to show what might be done in such a case by surgery, but the limitations of this operation are not mentioned. On the same page is an excellent illustration of conical cornea. One whole sheet is devoted to colored illustra-

tions of the Ishihara plates and an explanation of them. No mention is made of other tests for color blindness.

A large picture of an eye, said to be illuminated from a slitlamp, appears dramatically, but there is nothing in the illustration to indicate that the source of light was a slitlamp. A young lady is portrayed with various types of frames to show how they may not detract from but enhance the appearance. It is questionable whether the illustrator has proved his point, but to suggest that this is possible may help overcome some of the prejudice of those who should wear glasses but do not do so because they fear that their good looks will be handicapped. Photographs in and out of focus illustrate the appearance of objects to observers who have certain eye defects.

On the whole, the article has undoubtedly accomplished a good purpose in calling attention to the eye in an interesting manner and making its function a little clearer to the average reader. It will give him also an insight into what the ophthalmologist and the optician are attempting to do for the patient.

A point of importance is that the article is in no sense controversial. The question of ophthalmologist or optometrist is not even mentioned.

There is obviously a field for this kind of story, and the editors should be applauded for having published it. To help educate the public on such a subject is a service the value of which no one can question. One of the dangers lies in the misunderstanding of even a simplified presentation of technical matters. A more direct and sequential handling might give a clearer idea of the subject and can be used profitably in such popular-scientific magazines as Hygeia, but to find a place in popular literature the colorful aspect at some sacrifice of fundamental facts is undoubtedly essential.

It might be well, if this article on the eye proves popular, to suggest to the editors that at a later date an equally dramatic story and one which might do much good could be written on the subject of glaucoma. There indeed publicity is needed.

Lawrence T. Post.

THE BIFOCAL AGE

Sooner or later, the great majority of us need or will need bifocal glasses. If we do not learn to use them, we shall be deprived of one of the most important conveniences of modern life. Unless myopic, the sexagenarian or septuagenarian—even the quinquagenarian—without bifocals is constantly reminded of the fact that his eyes are no longer young. With bifocals, he remains for the most part unconscious of his ocular senescence.

Before he himself reaches the bifocal age it is difficult for an ophthalmologist to appreciate the conditions under which his presbyopic prescriptions are worn. Too frequently his basic instruction in this phase of his work has been limited to a rather crude means of estimating the amount of plus sphere which at various ages is to be added to the distant correction. He seldom has a very realistic conception of the reactions produced in his patients by the height, as well as the spherical strength, of the near segment. Probably most ophthalmologists who have themselves reached the years of presbyopia have found good cause to revise some of their earlier ideas on the subject.

Too often overlooked is the fact that presbyopia cannot safely be estimated in mere accordance with the patient's age. Cases of presbyopia arising before the age of thirty years are occasionally met, and presbyopia by the age of forty is not extremely uncommon. The only way

to know whether a patient is presbyopic, regardless of age, is to measure his accommodative power with the distant correction before his eyes (or using a stronger lens and making the corresponding allowance for the distant correction). Some oculists need to be reminded that the power of accommodation is not accurately indicated by the patient's statement as to the near range at which he can see most comfortably, but by the shortest range at which he can retain, even with an effort, maximum sharpness of some fine details such as photographically reduced printing or a fine line. The greater the visual acuity of the individual the smaller the test detail which ought to be applied to this purpose.

It used to be common teaching, upon excellent authority, that the patient might be allowed to use for steady close work two thirds of his accommodation. Suppose his accommodation amounted to three diopters, then for reading at thirteen inches he would require a total accommodative effect of three diopters. Allowing him to use two thirds of his accommodation meant that he could furnish two thirds of the total effect desired, and a lens addition of one diopter to his distant correction would therefore be provided to make up the difference between two and three diopters.

The present writer, after a good many years of presbyopia, as well as of experience with presbyopia in others, believes that a large number of patients are able to use steadily more than two thirds of their own power of accommodation.

It is perhaps advisable to remark that many calculations as to presbyopic addition to the distant correction have been and still are based upon undercorrection of the refractive error. But, if a patient who shows a total hyperopia of two diopters is given a correction of only one half that amount, he will naturally have to make up the difference, alike in far and near vision, by the use of an additional diopter of accommodation. The incomplete distant correction will affect the accuracy of the measurement made with regard to his power of accommodation, and will complicate the estimation of what is to be prescribed by way of a presbyopic addition. By the time the presbyopic age is reached there is seldom any good excuse for undercorrection of hyperopia, and upon the basis of such a misjudgment many a patient has been given bifocals before his time.

The habit of undercorrecting hyperopia (often even manifest hyperopia) is responsible for the very high figures given in many writings as to the relation between the patient's age and the amount of near addition to be given him. It has been quite commonly stated that a patient at forty-five years should have an addition of 1.00 D., a patient at forty-seven or forty-eight years an addition of 1.50 D., a patient of fifty an addition of 2.00 D., at fifty-five an addition of 2.50 D., and at sixty years an addition of 3.00 D. Some writers have even gone beyond these amounts at the respective ages.

A good many persons at the age of forty-five years, with full distant correction, are quite able to manage without a special near addition; many at fifty or even fifty-five years can get along with an addition of 1.50 D., even for rather exacting close work; and most patients at sixty with a near addition of 2.00 D. At the age of sixty years there is frequently an accommodative power of one diopter or more and, as Jackson has often pointed out, it is not uncommon to find accommodation of a half diopter at seventy years or later.

Fortunately, many ophthalmologists have learned not to depend upon the old "rule of thumb." Special occupations re-

quire special consideration. A carpenter, or especially a painter, finds it very difficult to work with a near addition which would be quite satisfactory for some bookkeepers. Even bookkeepers vary as to their requirements, because some must glance over a number of books and papers scattered across a large desk or table. Certain occupations, such as storekeeping, are sometimes very hard to suit because at fairly close range the eyes must be used for objects above the level of the patient's head.

Important, and often greatly misunderstood, is the problem of the height at which the bifocal segment shall stand before the patient's eye. There is a very general impression that bifocals cannot be worn comfortably unless the near segment is so low as to enable the patient to look habitually over it at the floor or other objects beneath him. It is a common experience to have a patient bring his bifocal glasses from the optician for checking, with the complaint that the reading part seems too high, it gets right in his way when he wants to read the printed page or to look at the sidewalk fifteen or twenty feet away. In such cases, the optician's impulse might be to lower the lenses, when in point of fact the fault is just the opposite, namely the bifocal segment has been set too low and must be raised instead of lowered. If, in such a case, the lens (with special reference of course to the near segment) is raised several millimeters, it will be found that the patient, if properly instructed by the ophthalmologist as to what he must expect, soon becomes entirely comfortable and finds little difficulty in using the bifocals.

For many years past the writer of this comment, profiting especially by his personal experience, has made a point of giving the patient, especially if the latter is being newly initiated into the mysteries of bifocals, careful instruction as to how to face the new undertaking. In the first place the average patient is told that he will obtain the greatest comfort in reading and other close work from a relatively high position of the segment. The optician is expected to place the segment at such a height that, when the patient gazes horizontally into the distance, the upper edge of the segment will be horizontally in line with the point at which the center of the inner edge of the lower eyelid touches the eyeball. This is usually a safe criterion (much safer than merely referring to the height of the segment in the lens) although in some cases, and for some special purposes, the segment can be worn comfortably at a somewhat greater height than this.

The patient may be shown with test lenses just how much his view of the floor will be blurred by the near segment. He is advised to devote some little time to walking about in his home, keeping his head approximately erect and looking intermittently at the floor "through the blur"—"accepting the blur." Then it is advisable for him to find some steps or stairs down which he can walk several times with the same technique, at first depending in some degree upon the sense of touch as the sole of his foot strikes the edge of each step, but again "accepting the blur" and appreciating how little the blur actually interferes with his ability to judge position. (The patient with a low position of the segment is often in real danger of tumbling downstairs because of his bifocals, since he is particularly prone to look at the edge of a step through the junction of far and near segment.)

Patients who are thus carefully instructed in advance, and who possess any faculty for adaptation to new conditions, seldom find serious difficulty in accustoming themselves to bifocals; provided, of course, that the optician's complete coöp-

eration is obtained for accurate placing of the lens.

It is naturally easier to learn to use bifocals in the earlier than in the later stages of presbyopia. The amount of blur produced by the segment in looking at the ground or floor is relatively insignificant with a 0.75 or 1.00 D. addition; very much greater with a 2.50 D. addition. Thus it is better for the patient to adapt himself to bifocals while only a moderate addition is required than to postpone the attempt until he is much older and requires a strong addition. The patient should be advised that, even though he experiences at first some amount of difficulty and annoyance, the ultimate advantages make the effort extremely worth while. Retention of the youthful ability to see clearly both distant and near objects automatically, and without having to hunt for a pair of glasses which have frequently been left in another part of the house or miles away, is something to be desired. The ophthalmologist's knowledge and experience should put him in a better position than the patient to realize these circumstances.

The patient who insists that for near work he can only be comfortable with a separate pair of glasses has almost never had opportunity to try a high position of the near segment. This fact, with or without that pride of personal appearance which often prevents the habitual wearing of a distant correction, is the probable explanation of the somewhat ludicrous exhibition afforded by the lecturer who doffs and dons a pair of shell-rimmed reading glasses every ten or twenty seconds during his address. How much more dignified and comfortable would be the wearing of a suitable bifocal, with which he could see clearly both audience and manuscript!

One must recognize that for some purposes bifocals are rarely acceptable. These purposes include such sports as tennis and golf, piano playing (if ability to see quickly both the score and the keys is desired), and card playing. For the last two purposes, and occasionally also for other occupations, a separate correction intermediate between the distant and near spherical strengths may be prescribed with much benefit. Rarely, it may be advisable to prescribe different strengths of bifocal addition for daytime occupation and evening reading, respectively. The elderly patient who likes to hold his book upon his knee will seldom be altogether comfortable with a rather ample addition for close work. Thus, even after the age of sixty years, he may occasionally object to any addition stronger than 1.50 D.

It may be advisable to warn against the well-meant tendency of some opticians to tilt excessively bifocals which have been prescribed after cataract extraction. Not only as to near but as to distant vision, such excessive tilting sometimes reduces the patient's visual efficiency by an important percentage.

W. H. Crisp.

BOOK NOTICES

TRAITÉ D'OPHTALMOLOGIE, Paris, Masson et Cie, 1939.

Volumes III and VI appeared in October, 1939. Volume III (1,146 pages, 460 illustrations, and 9 colored plates) covers laboratory technique, the examination of motility and binocular vision, anomalies of vision, and part of pathology.

The volume begins with a chapter by Dubois-Poulsen (of the Lariboisière) on the chemical and serologic examination of the blood, spinal fluid, and the intraocular fluids. More space could have been profitably devoted to the last, but the bibliography is full and recent, so that those interested know where to turn.

Methods of examination and the more common bacteria are discussed by Carrière, who likewise writes a short but satisfactory chapter on anatomo-pathologic technique. Senevet's contribution on the animal parasites of the eye is well written and illustrated. Methods of investigation of ocular motility and binocular vision are described by Nordmann and Onfray, respectively. The diploscope, which is apparently more frequently used in France than elsewhere, occupies a prominent part.

The section devoted to anomalies of vision is made up of chapters on ametropia in general by Joseph, myopia by Mawas, presbyopia and accommodative disturbances by Hambresin, vision and correction of aphakic patients by the well-known physicist Haas, anomalies of the light sense by Bourdier, and anomalies of the color sense by Professor Polack (illustrated with color charts, especially those of Ishihara). This is one of the most valuable chapters of the first portion of the volume.

The remaining two thirds (approximately) of the volume is devoted to pathology, by which is meant the signs, symptoms, clinical evidence, pathology, and treatment of the various conditions under discussion. The subject is introduced by descriptions of histopathologic and biologic reactions, giving a broad foundation upon which to build later specific topics. Professor Redslob and Gery begin with a magnificent and well-illustrated description of cytopathology, inflammation, and neoplastic processes as applied to the eye. The way in which these subjects are handled forms one of the most outstanding parts of this volume and even of those previously reviewed. Twenty-five pages are devoted to ocular allergy by Koutseff and 29 pages to the vitamins by Berzssonoff, who mentions the chemical composition and discusses the clinical application of the various ones.

Professor Terrien has a short but important chapter on the relationship of general pathology to ophthalmology, which he covers with broad strokes. The next 100 pages are dedicated to a well-written and illustrated discussion of the internal secretions and their relationship to ophthalmology by Franceschetti and Gorin of Geneva. The part on the thyroid is particularly good, and attention is directed to the work of the American investigators such as Smelser, Friedenwald, Naffziger, and others. Professor Terrien, whose genius in correlating, in brief and succinct form, the entire philosophy of ophthalmology is well recognized, utilizes only 62 pages to cover, more than sufficiently, the general symptomatology of ophthalmology.

Villard's chapter on diseases of the eyebrow region, Aubaret's contribution on the diseases of the lids, and, particularly important, Kalt's chapter on tumors of the lids are rich in diagrams and illustrations. The microphotographic reproductions are especially noteworthy. Sedan of Marseilles closes the volume with a splendid chapter on disturbances of the motor apparatus of the lids.

Volume VI (960 pages, 390 illustrations, 18 colored plates). Pathology (completed) and ocular neurology (beginning).

The exceedingly high standard set by the preceding volumes is continued. Koby, whose well-known book on the "Biomicroscopy of the vitreous body" appeared in 1932, elaborates and enlarges on this subject in his chapter on diseases of the vitreous body. Many of the splendid illustrations in color that appeared in his book are utilized, along with others that are new, to increase the value of his contribution.

J. Coppez writes a brief description of anophthalmos and microphthalmus, and one on panophthalmitis. L. Coppez dis-

cusses burns of the globe of whatever nature, and also handles well the subject of sympathetic ophthalmia, the bibliography of which appears to be complete. Professor Danis's (Brussels) chapter on ocular injuries is possibly too much in an outline form, but the part on siderosis bulbi is particularly good.

The most valuable part of this volume is the work of Dr. Magitot on pathologic tension. Here, as would be expected, the approach and descriptions are masterly and the illustrations pertinent. The part on primary glaucoma is particularly commended.

Professor Terrien's 120-page chapter on diseases of the orbit is also outstanding. There does not appear to be anything missing from the clinical and pathologic descriptions and photographs of ordinary and rare orbital conditions.

André Patry of Geneva, whose thesis of Paris, 1905, established him as an authority on the subject, presents an unusual and interesting work on the cranio-orbito-facial malformations. G. Worms and Tille's chapter on the ocular manifestations in relation to diseases of the ears follows next. Vestibular nystagmus deserves the prominent place it receives. Professor Worms's writings on the orbito-ocular complications of sinusitis are authoritative and complete. The illustrations, well documented, punctuate an excellent text. The work is continued in a chapter on the tonsillar-pharyngo-nasal origin of ocular disease, and completed by that on ocular disease of dental origin by the aforementioned authority. The *modus operandi* of focal infection is well described.

The last third of the volume is devoted to part of ocular neurology. After an introductory chapter by Tournay on the explanatory introduction to ocular neurology, in which the subject is treated in a general way, Professors Gilbert and Gabriel Sourdille present an outstanding chapter on diseases of the optic nerve, from a nontraumatic and nonneoplastic point of view. The most important topics covered at length are retrobulbar optic neuritis, papillary stasis, and optic atrophy. Jean Nordmann discusses tumors of the optic nerve, with many photomicrographs to emphasize his points. Hartmann and David begin the portion devoted to the diseases of the central optic pathways, with the chiasmic disorders. Monbrun continues with the diseases of the optic pathways behind the chiasm and of the visual cortex, devoting some space to psychic blindness and visual hallucinations. J. Gallois brings the volume to a close with a 14-page description of ophthalmic migraine, with interesting drawings of scintillating scotomata. His classification of migraine is both sensible and practical.

The reviewer is forced by the completeness and beauty of the volumes (6) which have so far appeared to express his sincere and profound admiration and respect to those responsible for this work. The volumes reviewed above have appeared on time, regardless of the war and consequent troubles and hardships. This speaks well indeed for French courage and morale.

Derrick Vail.

TRANSACTIONS OF THE PACIFIC COAST OTO-OPHTHALMOLOGICAL SOCIETY, 1939. Clothbound, 270 pages.

These transactions appear in a form similar to that of previous transactions of this society. This is a well-bound volume of convenient size and shape, printed on good paper that lends itself to the detailed reproduction of illustrations. It records the meeting held in San Francisco on June 19th to 22d. An excellent picture of the president, Dr. Frederick C.

Cordes, appears on the first page, followed on the succeeding pages by photographs of the other officers.

After the presentation of the program appear the articles otological and ophthalmological. The first is an excellent paper by a guest, Dr. Leroy A. Schall of Boston, Massachusetts, who has recently been appointed to succeed Dr. Mosier as professor of otolaryngology in the Department of Ophthalmology of Harvard University. His subject was "Malignant disease of the upper respiratory tract." This includes a considerable amount of plastic surgery around the eye.

Of the many ophthalmic papers the first was that of Cordes and Hogan on "Angiomatosis retinae" with special stress on the treatment phase, which is an element not considered in many previous communications. Analysis, however, of cases in the literature as well as the one here reported indicates that early treatment with radiation, preferably radium, is valuable in its effect on the local lesion, although obviously it is useless in the systemic disease.

Another paper of great interest was that of Henry P. Wagener from the Mayo Clinic, also a guest of the society, on "The significance of spasm in retinal arteriolar disease and in retinitis." This author can speak with as much authority as any one on this subject, which he has studied for many years. The paper is well worth a careful study.

Campion described and illustrated the technique of color photography of the fundus oculi. Otto Barkan pointed out the advisability of choosing the operation for glaucoma in accordance with the particular type of the disease, determinable by careful examination of the patient, especially of the angle of the anterior chamber. He decried the current practice of using an operation merely because it is one with which the surgeon is most familiar. Carruth described a modification of the evisceration operation, and Lachman discussed fibrosis of the caruncle simulating new growth. A case of ocular lymphocytoma was cited by Carroll Smith, and the literature reviewed. George Kilgore reported three cases of arachnodactyly, and George Landegger a case of Filaria loa in the eye. Carl Jensen analyzed the previous reports on sympathetic ophthalmia following cataract surgery and reported one case which he thought was due to the cauterization of a prolapsed iris. Robert Randolph and Harold Joy have previously suggested that such cauterization might be a factor in the production of sympathetic ophthalmia. The author is inclined to concur with them in this belief.

There was an instructional program which covered the management of corneal scars by Frederick Kiehle; office methods for muscle tests and treatment by Horace G. Merrill; the management of complications of cataract surgery by Andrew J. Browning; and blepharitis by Joseph W. Crawford.

Lawrence T. Post.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

ASSISTED BY DR. GEORGE A. FILMER

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy, embryology, and comparative ophthalmology

6

CORNEA AND SCLERA

Seefelder, R. **Episcleritis and scleritis with special consideration of episcleritis periodica fugax.** Klin. M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 417.

Four cases are reported. One, a woman of 40 years, had very painful attacks every two or three weeks in both eyes. After intramuscular injections of calcium she remained free from attacks for six months. In a woman of 60 years who had long been observed under a diagnosis of iritis and episcleritis, enucleation finally became necessary. Pathologic changes in the ciliary body indicated tuberculosis, a disease which plays an important role in the etiology of scleritis.

C. Zimmermann.

7

UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Bischler, V. **The nature of Vogt's stripes (retroiridic pigment lines of the anterior capsule) in 22 new cases.** Klin. M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 517. (See Section 9, Crystalline lens.)

Clavel, André. **Contribution to the study of circulation of the aqueous humor.** Ann. d'Ocul., 1939, v. 176, Sept., pp. 657-671.

When the intraocular tension is artificially raised beyond a certain threshold, increased elimination of aqueous tends to bring the tension back to the previous level. When the intraocular tension is artificially lowered beneath a definite threshold, an increased amount of aqueous is formed in the eye until the tension approaches the former level. Contraction of the ciliary muscle assures circulation of the aqueous and its replenishment, but normal movements of the extrinsic muscles of the eye and of the iris are without effect.

John M. McLean.

Franceschetti, A. **Technique of formation of artificial pupil (corepraxis).** Klin. M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 459.

Franceschetti describes his method, especially useful in cases of postoperative displacement of the pupil with formation of membranes. He makes a small incision with a thin, lance-shaped knife, introduces a small but suffi-

ciently long hook into the anterior chamber, and makes moderate traction on the iris and membrane and thus on the ciliary body. There is little or no loss of vitreous, and only slight danger of hemorrhage, especially after treatment (with calcium, vitamin C, glaucosan). For these reasons the danger of phthisis bulbi is reduced to a minimum. C. Zimmermann.

Hess, W. R. **The pupil and the midbrain.** Klin. M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 407.

Eye reactions play a very important role in vegetative (so-called autonomous) and animal (so-called cerebrospinal) functions. The former serve to regulate intrinsic conditions of the organism, the latter control the activities by which the organism as a whole becomes oriented to its environment (sensory functions). The role of the midbrain in the functions of the whole central nervous system can be investigated by excitation and elimination experiments; and by the pupillary reactions cinematographically recorded. Fine electrodes are introduced through small bored holes in the cranium for the excitation experiments. In the elimination experiments, electrocoagulation by diathermy current is used to destroy nuclear centers and fiber tracts. The zone of mydriatic action has been found to be in the posterior hypothalamus, that of miosis in the anterior hypothalamus and the medial parts of the ventral nuclei. C. Zimmermann.

Lucic, Hugo. **Sensitization of rabbits to uveal tissue by the synergic action of staphylotoxin.** Arch. of Ophth., 1939, v. 22, Sept., pp. 359-369.

The author describes the method by which the uveal-tissue toxin was prepared and the results of experiments in which repeated intracutaneous injections of bovine uveal-tissue toxin produced hypersensitivity to swine, rabbit, and autogenous uveal pigment in six of the 22 rabbits. Similar sensitizing injections of rabbit uveal-tissue toxin or of uveal-tissue pigment alone failed to produce sensitization. Iridectomy and single intraocular injections of uveal pigment in hypersensitive animals produced a histologic picture similar to that observed in tissues of control animals, but not simulating the picture commonly observed in sympathetic ophthalmia. The histologic cellular reactions observed in tissues excised from the skin two weeks after the injection served as the criterion for hypersensitivity. Photomicrographs showing positive and negative reactions accompany the report.

J. Hewitt Judd.

Marsigli, L. **Adie's syndrome.** Riv. Oto-Neuro-Oft., 1938, v. 16, July-Aug., pp. 349-352.

Etiology of the syndrome and the differential diagnosis from the Argyll Robertson pupil and internal ophthalmoplegia are discussed. (Bibliography.) M. Lombardo.

Waardenburg, P. J. **Progressive central tapetochoroidal degenerations.** Ophthalmologica, 1939, v. 98, Sept.-Oct., p. 6. (See Section 10, Retina and vitreous.)

8

GLAUCOMA AND OCULAR TENSION

Biro, Imre. **Notes on the heredity of glaucoma.** Ophthalmologica, 1939, v. 98, Sept.-Oct., p. 43. (See Amer. Jour. Ophth., 1940, v. 23, Jan., p. 98.)

Boros, Bela. **The effect of iris and ciliary-body extract on intraocular**

pressure. Graefe's Arch., 1939, v. 140, pt. 3, pp. 507-514.

The extract, obtained from pigs' eyes, was freed from albumen and dissolved in a watery solution. The material was used intramuscularly, first in rabbits, and then in human patients with normal and glaucomatous eyes. A two-phase alteration was produced in the ocular tension: first, an initial increase of 5 to 6 mm. in pressure, then a reduction in pressure to 5 or 6 mm. below the initial intraocular pressure. These changes were somewhat more marked in the eyes of patients with glaucoma. The extract caused a decrease of 8 to 10 mm. of mercury in the blood pressure, this effect following shortly after the change in the intraocular pressure. Charles A. Perera.

Feldman, J. B. **Dark adaptation, night blindness, and glaucoma.** Arch. of Ophth., 1939, v. 22, Oct., pp. 595-607. (See Section 10, Retina and vitreous.)

Gradle, H. S., and Snydacker, D. **Retinal detachment occurring in primary compensated glaucoma.** Amer. Jour. Ophth., 1940, v. 23, Jan., pp. 52-59.

Seefelder, R. **(a) Genealogy of a family with congenital cataract. (b) Fixation of the globe in cyclodialysis (Heine).** Deutsche Ophth. Gesell., 1938; in Klin. M. f. Augenh., 1938, v. 101, July, p. 107.

(a) See Section 9, Crystalline lens.

(b) Simple and reliable fixation is obtained by means of an ordinary toothed forceps applied to the insertion of the previously exposed external rectus muscle. The scleral section is made immediately below the line of insertion, 6 mm. from the limbus, and should be double the width of the spatula. In this way, the entire lateral half of the ciliary body can be detached, resulting in marked and lasting diminution of intraocular tension. Cyclodialysis is the best and most reliable operation in simple glaucoma, and it may also be of inestimable value, under certain conditions, in other forms.

Percy Fridenberg.

Teräskeli, Hilja. **Investigation of the simultaneous action of several miotics and mydriatics on the intraocular tension.** Ophthalmologica, 1939, v. 98, Sept.-Oct., p. 16.

The effect of syntropan (a synthetic atropine substitute) combined with the commonly used miotics was studied on 35 eyes of 23 patients. It prevented contraction of the pupil without raising the intraocular tension in all eyes except those which required miotics more than four times daily in order to keep the tension within normal limits; this action may be particularly advantageous in eyes with central opacities. The drug also prevents disturbances of accommodation. Since syntropan can enlarge the pupil without raising the tension and lower the tension without contracting the pupil, its mode of action is of theoretical importance in considering the mechanism of the fluid exchange of the eye and the genesis of glaucoma. F. Herbert Haessler.

9

CRYSTALLINE LENS

Bakker, A. **Carbonic-acid anhydrase in normal and cataractous lenses.** Graefe's Arch., 1939, v. 140, pt. 3, pp. 543-552.

Carbonic-acid anhydrase, a ferment which probably plays an important part in lens metabolism, is reported for the first time in high concentration

in the normal lens. The author's findings indicate a relationship between aerobic glycolysis, avascularity, and anhydrase content of the lens. The concentration of this enzyme in lenses of different individuals of the same species is constant. The enzyme is very stable. There may be a causative relationship between lens opacities and anhydrase content of the lens. In mature cataracts, this enzyme has completely disappeared. Charles A. Perera.

Bischler, V. **The nature of Vogt's stripes (retroiridic pigment lines of the anterior capsule) in 22 new cases.** Klin. M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 517.

In four of the 22 cases the stripes were combined with previously undescribed and comparatively rare pigment or senile changes. In two cases there was a senile punctate anterior suture, in one case a Krukenberg spindle, and in another case desquamation of the anterior capsule without glaucoma. The condition appeared to occur more frequently in women. The ages were between 14 and 74 years. The majority showed changes of the pupillary seam. All this seems to speak in favor of Streiff's hypothesis that the pigment particles of the stripes originate in the pigment stratum of the posterior surface of the iris. This hypothesis is further supported by the fact that in some cases the stripes disappear; this was observed in two patients 4 years and 18 months respectively after the appearance of the stripes.

C. Zimmermann.

Bücklers, M. **Aureola, a physiologic phenomenon of the anterior surface of the lens.** Klin. M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 413.

Bücklers observed the aureola, which so far has been found mostly in glassmakers, in 72 out of 100 persons between 8 and 64 years of age. It is therefore a rather frequent normal change of the anterior surface of the lens. It is visible only through the slit-lamp and on account of its very fine structure is easily overlooked. It consists of fine radial striations.

C. Zimmermann.

Marchesani, O. **Brachydactyly with congenital globular lens, as a systemic disease.** Klin. M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 392.

Two genealogic trees are given of patients showing globular lenses and brachydactyly as constitutional anomalies. This syndrome represents in all essentials the opposite of arachnodactyly. C. Zimmermann.

Rochat, G. F. **Is lactoflavin demonstrable in a single human lens?** Klin. M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 432.

Vogt found that the ingestion of lactoflavin has no influence upon the development of cataract. Rochat examined a series of lenses extracted in the clinic as to their contents of lactoflavin, with negative results; but easily found a substance which with great probability may be considered as a product of disintegration of lactoflavin. This substance occurs in both young and old lenses but in the presence of cataract it is found only in proportion to the amount of transparent tissue.

C. Zimmermann.

Seefelder, R. **(a) Genealogy of a family with congenital cataract. (b) Fixation of the globe in cyclodialysis (Heine).** Deutsche Ophth. Gesell., 1938; in Klin. M. f. Augenh., 1938, v. 101, July, p. 107.

(a) In a family which had come many years previously from South Tyrol congenital cataract was noted in 16 members in five successive generations, as compared to 58 members with normal eyes. The mendelian characteristic was dominant. The lens changes were mainly anterior capsular and central with some opacification of the neighboring lens substance, but not involving the peripheral region. These cataracts showed a marked tendency toward shrinking. In one case there was a pure zonular opacity, and in another, a posterior polar cataract. The visual result of operation was generally poor. Most of these patients, as well as the unaffected members of the family, were morally inferior, antisocial, and criminally inclined. While this heritage could be traced to a male progenitor, the cataract inheritance was originally from an ancestress.

(b) See Section 8, Glaucoma and ocular tension. Percy Fridenberg.

10

RETINA AND VITREOUS

Bedell, A. J. **Traumatic retinal angiopathy.** Arch. of Ophth., 1939, v. 22, Sept., pp. 351-358.

Three cases are reported to illustrate three types of retinal angiopathy: (1) that due to fracture of the lumbar vertebrae, (2) that due to compression of the chest and traumatic asphyxia, with fracture of the dorsal vertebrae, and (3) that due to direct injury to the head. The lesions were bilateral in the first two cases, although less obstructive in one eye than in the other. In the third case, the damage was limited to the eye on the side of the injury. The early and terminal stages of this case are shown in colored photographs. It has been found that the exudate often precedes the hemorrhages and that there is no evident relation between the amount of exudate and the visual end result. The amount of damage to the optic nerve cannot be evaluated until the white areas begin to clear. When compression of the nerve produces pallor of the disc, progressive optic atrophy is to be expected and this usually ends in blindness. The author points out that many mild cases have been unrecognized or overlooked. Every person with suspected trauma to the skull should be examined by a competent ophthalmologist, since preservation of life may depend on a correct understanding and appreciation of the fundus changes. (Brief review of literature, bibliography.)

J. Hewitt Judd.

Cosmettatos, G. F. **My experience with operation for detachment of the retina by diathermal coagulation.** Klin. M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 452.

The author reports his results of treatment with diathermal coagulation as 62 percent complete cures and 12.19 percent partial cures. The causes of incomplete results are mentioned.

C. Zimmermann.

Dedimos. **Sudden blindness in children.** Ann. d'Ocul., 1939, v. 176, Aug., pp. 605-615.

Sudden blindness in children may occur as the result of arteritis or spasm of the central retinal artery. The first of these is usually a manifestation of congenital syphilis and the second a sympathetic vasomotor disturbance of nonsyphilitic etiology. Other causes are acute retrobulbar neuritis and cortical lesions. John M. McLean.

Feigenbaum, A., and Rachmilewitz, M. **The significance of retinal findings**

in hypertensive vascular and renal disease. Acta Ophth. Orientalia, 1938, v. 1, Dec., p. 65.

In 183 patients the authors correlated the medical findings with the fundus picture. Characteristic of benign hypertension are general attenuation of the arteries, arteriovenous compression, and moderate tortuosity of vessels with caliber changes. The arteries are also attenuated in malignant hypertension, but here the narrowed and sclerosed arterioles cause a venous stasis which in turn produces nutritional disturbances in the retina, such as retinal foci, hemorrhages, edema, and papilledema. It should properly be called arteriolosclerotic retinopathy. The characteristic feature of chronic nephritis is arterial constriction. The arteriolosclerotic changes and the venous hyperemia are present only to an insignificant degree. R. Grunfeld.

Feldman, J. B. **Dark adaptation, night blindness, and glaucoma.** Arch. of Ophth., 1939, v. 22, Oct., pp. 595-607.

Attention is called to the occasional presence of night blindness in patients suffering with renal calculi and glandular and lymphatic diseases, as well as its frequent occurrence in association with avitaminosis A. The charts used for the plotting of the curve give the intensity of the light in photons as the ordinates and the time at which each light threshold was taken as the abscissas. This makes it possible to evaluate easily the relation between cone and rod adaptation. It was found that night blindness did not bear any relation to the intensity of pathologic dark adaptation. The treatment of night blindness and avitaminosis A is discussed briefly. In a few cases of glaucoma a high cholesterol content of the blood was found. It is suggested that the examination of a large number of persons with beginning and complicated glaucoma may possibly determine whether or not defective sterol metabolism plays any part in the cause or the effect of glaucoma. Pathologic dark adaptation may be found of value as an indication in the evaluation of faulty metabolism of the liver. (Discussion.)

J. Hewitt Judd.

Gradle, H. S., and Snydacker, D. **Retinal detachment occurring in primary compensated glaucoma.** Amer. Jour. Ophth., 1940, v. 23, Jan., pp. 52-59.

Heinsius, E. **Etiology of the retinal disease in diabetes mellitus.** Klin. Woch., 1939, v. 18, Aug. 26, pp. 1153-1156.

The author analyzes 101 cases of diabetes, with special consideration of complicating retinal disease and of those factors (blood pressure, renal disturbances, blood-sugar level, diabetic fat metabolism) to which the retinal disease has been attributed by investigators of this problem.

Among the 101 diabetics 32 were found to have retinal disease; of these, 41 percent had no demonstrable cardiovascular disease. Renal insufficiency has been held responsible for the retinal disease especially in young diabetics, but in two young patients with retinal lesions, no renal insufficiency could be found. Most of the 32 patients had blood-sugar levels between 150 and 350 mg. per 100 c.c. Below 150 and above 350 very little inclination for retinal complication existed, findings which coincide with the statistics of other investigators. No connection between ketonuria and retinal disease could be found. The pathogenesis of the retinal lesions in diabetics has not

as yet been clarified, and the author is inclined to think that several factors are responsible. He also considers the possibility of endocrine influence and points out the fact that insulin is an antagonist of adrenalin and thyroxin.

Bertha Klien.

Lauber, H. **Distribution of rods and cones in the retina and its relation to the isopters of the visual field.** Deut. Ophth. Gesell., 1938; in Klin. M. f. Augenh., 1938, v. 101, July, p. 94.

Previous knowledge of the quantitative relations of rods and cones in the different regions of the retina has not been sufficient to explain the incongruence of isopters in the nasal and temporal halves of the retina respectively. The author made use of microscopic sections parallel to the surface in various regions, as well as of meridional sections going through the macula, to determine the numerical relation of rods and cones in the nasal and temporal halves of the retina at equal distances from the nerve head. In the nasal retina in front of the equator the ratio of rods to cones was 366:91. In the corresponding temporal sector the ratio was 505:74. Percy Fridenberg.

Levina, L. C. **The retinal vascular pressure in choked disc.** Viestnik Opht., 1939, v. 15, pt. 1, p. 54. (See Section 11, Optic nerve and toxic amblyopias.)

Mamola, P. **A study of chorioretinitis (juxtapapillaris of Jensen).** Ann. di Ottal., 1939, v. 67, Aug., p. 618.

The author, after a rapid survey of the literature of this very rare disease, discusses its pathology and etiology. He reaches the conclusion that, as in two cases reported, it is usually of tuberculous origin. (4 figures, bibliography.) Park Lewis.

Meyerbach, Fritz, and Loewenberg, R. D. **Bilateral ring scotoma of five years' duration.** Arch. of Ophth., 1939, v. 22, Oct., pp. 674-678.

After a brief review of the literature, the authors report the case of a woman aged 44 years who had had for five years a symmetric, bilateral, ring scotoma. Treatment with folliculin menformon produced some improvement, which would suggest a disturbance of the internal secreting glands.

J. Hewitt Judd.

Rieger, Herwigh. **A peculiar disease of the macular region,** Graefe's Arch., 1939, v. 140, pt. 3, pp. 456-467.

The author observed five cases of macular disease occurring in young or middle-aged patients and involving one eye. The patients were all in good health and complained solely of reduction in vision of one eye. Three cases showed a rounded, yellowish-white (later grayish), well-defined area in the region of the macula, with adjacent hemorrhages in the outer layers of the retina. In one case the characteristic macular lesion developed after the appearance of retinal hemorrhages. In the fifth case, the disease was ushered in by an extensive edema involving the posterior pole. The vision in two of the patients improved greatly after healing of the lesion; in these individuals the fovea had been spared. All of the five patients showed a more or less strongly positive Mantoux test. Tuberculin injections were employed in the treatment of all cases, but had to be discontinued in one patient who showed signs of a local reaction and a hematogenous dissemination. Tubercle bacilli were found in the blood stream of this patient. Rieger compares his cases with those described by Coats (Ophth. Year Book, 1912, v. 9,

p. 244) as "retinitis exudativa s. hemorrhagica externa," but emphasizes the need of classifying his cases as examples of chorioretinal disease. He believes tuberculosis to be the most important and frequent cause of retinitis exudativa externa. The reduced frequency of patients with severe Coats's disease, and the more frequent appearance of the milder forms of macular disease are commented upon.

Charles A. Perera.

Rötth, Andreas de. **Bilateral detachment of the retina.** Szemészet, 1939, v. 2, June, p. 3.

The author observed 33 cases of binocular detachment of the retina. The average age of the patients at the onset of the disease was 39 years, and in 70 percent of the cases the second eye followed the first within five years. Not only was the same type of hole observed in each eye, but they occurred for the most part in symmetrical parts of the retina. This uniformity in the two eyes suggests that, in consequence of a congenital disposition of the germ plasm, a presenile and senile degeneration of the retina, vitreous, choroid, and vessels develops which leads to detachment of the retina. One type of bilateral detachment is even considered by the author as a primary heredodegenerative disease in the pathogenesis of which senility plays no role.

R. Grunfeld.

Sobhy Bey, M., **Ruptures without detachments and detachments without ruptures, and their treatment.** Schweizer med. Woch., 1939, v. 69, Oct. 28, p. 1067.

In four cases retinal rupture was followed by detachment, in two surgery prevented the detachment. All six cases had myopia of more than eight diopters. The author recommends the Guist-Lindner method. In detachment without rupture (tear) he makes a barrage in the whole area 15 to 18 mm. from the limbus by the Safar method or by Vogt's method of electrolysis.

Theodore M. Shapira.

Spadavecchia, Vitangelo. **Coats's retinitis, a clinical study of a bilateral case of this disease.** Ann. di Ottal., 1939, v. 67, May, p. 321, and Sept., p. 641.

The author reports a clinical case of chronic plastic angiogliomatous retinitis which was bilateral with uveal involvement. This he identifies as typically Coats's retinitis, which he differentiates from other morbid intraocular conditions having similar manifestations.

The disease is rarely bilateral. In this case the media were sufficiently clear to make the retinal changes clearly visible. The fundus was markedly elevated owing to the presence of a subretinal plastic mass; there were abundant whitish fibrillae, glial proliferations, excessive proliferations and changes in the retinal venous and capillary vessels, and inflammatory alterations in the retinal tissue with deposits of cholesterin crystals in the periphery. Involvement of the uvea was indicated by an iridocyclitis. The pathology is extensively discussed and the author favors a vascular rather than retinal-tissue origin. A congenital defect with secondary destruction of the retinal tissue causes transudations in the subretinal structure which ultimately destroy the retinal tissue, deposits of albumen and detritus forming an exudative mass which later changes into connective tissue. Treatment included high fre-

quency current. (2 figures in color, 4 in black, 3 tables, bibliography.)

Park Lewis.

Streiff, E. B. **Chorioretinitis centralis serosa and its differentiation from retinitis centralis angioneurotica.** Klin. M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 524.

In a girl of 21 and in a man of 27 years a chorioretinitis centralis serosa was observed. The latter case differs from the description given by several Japanese authors in the presence of hypopyon-like formation in the lower part of the vesicular edema of the macula, in the long duration of the disease, and in the poor prognosis with regard to vision. Comparison of the symptoms of chorioretinitis centralis serosa and those of retinitis centralis angioneurotica shows that they present two different clinical pictures.

C. Zimmermann.

Vercelli, Giuseppe. **An undescribed variety of familial disease: retinitis pigmentosa and myoclonic epilepsy.** Riv. Oto-Neuro-Oft., 1938, v. 16, July-Aug., pp. 315-330.

Since the onset of menstruation at the age of 16 years and at every recurrence thereafter, a 41-year-old woman had manifested an emotional state with intense trepidations, asthenia, and headaches. During her first puerperium she also noted a progressive diminution of visual power with hemeralopia and photophobia. Her condition became worse with each menstrual period or puerperium so that at the time of examination she was almost blind and she had myoclonic manifestations, some of which ended in true epileptic convulsions. Her mother had been similarly affected and two brothers presented the same ocular syndrome. This case showed evidences of functional changes in the diencephalic-hypophyseal complex, which lately has been related to the pathogenic mechanism of retinitis pigmentosa. The possible relation of the two syndromes, the pigmentary retinitis and the neurodystrophies, is discussed. (Bibliography.)

M. Lombardo.

Waardenburg, P. J. **Progressive central tapetochoroidal degenerations.** Ophthalmologica, 1939, v. 98, Sept.-Oct., p. 6.

Waardenburg reports a hitherto-undescribed fundus picture seen in both eyes of a 46-year-old male. The extreme periphery of each retina was normal and moderately pigmented. A contiguous zone further forward looked like a fundus flavus, and the entire posterior pole was brilliantly white in some areas and grayish in others. The arteries were reduced to one half of their normal calibre. What pigment remained lay in the deepest strata. The fields were slightly contracted and there was a central scotoma 10 degrees in diameter. There was no evidence of general bodily disease, and no family history of eye trouble.

It seems clear to the author that the dystrophy could not have originated in the retina. Repeated observation revealed no thinning or atrophy of the retina. When looking with the ophthalmoscope, one had the impression of looking through clear water to a sandy bottom, in this case the sclera. In its course this dystrophy differs from choroideremia and atrophia gyrata of the choroid and retina in that the central portion of the retina retains its functions longer in the last-named diseases.

F. Herbert Haessler.

11

OPTIC NERVE AND TOXIC AMBLYOPIAS

Bogdanovich, I. I. **Positive transitory central scotoma in retrobulbar neuritis caused by plasmocide poisoning.** Viestnik Opht., 1939, v. 15, pt. 1, p. 88.

A report of four cases of toxic neuritis caused by plasmocide. In two of these a Weekers scotoma could be demonstrated; in one case it disappeared at the transition of the central scotoma from absolute to relative. In the second case the scotoma could at first be demonstrated; after two weeks it could no longer be elicited, although there was but slight improvement in visual acuity. These two cases support Joiris's contention that a Weekers scotoma is pathognomonic of toxic neuritis. (Illustrations.) Ray K. Daily.

Dandy, W. E. **Papilledema without intracranial pressure (optic neuritis).** Ann. of Surg., 1939, v. 110, Aug., p. 161.

Although papilledema is the most significant objective finding in brain tumors, it is by no means pathognomonic of them. In 1937 Dandy reported a series of cases in which there was bilateral papilledema with increased intracranial pressure and yet no brain tumor. The present report is concerned with another, even larger, group of cases having papilledema, usually bilateral but at times unilateral, frequently with hemorrhages in the eyegrounds, usually with a mild degree of headache, and with varying degrees of visual loss. This group differs from the first in the absence of elevated intracranial pressure. The underlying pathologic process is therefore largely of local origin and may be classified as "optic neuritis," "papillitis," or "retrobulbar neuritis," if it is understood that these designations do not necessarily connote an inflammatory process.

Forty-four cases are summarized in a table. The etiologic or pathologic bases are unknown, except that two cases of multiple sclerosis and two of encephalitis are included. Although there is evidence of intracranial involvement in some cases, in others there is none. The papilledema may be unilateral, but is much more commonly bilateral. The condition carries no danger to life, and heals spontaneously in the course of a few weeks or months. No effective form of treatment is known. Operative intervention is contraindicated. Women are affected nearly three times as frequently as men. It occurs with about equal frequency in all decades of life except the second, in which it is two and one-half times as common. The outstanding symptom is loss of vision. Scotomata, field defects, and blindness may develop with great rapidity, but normal vision may return. Permanent blindness resulted in only one case. Hemorrhages occur with great frequency in the eyegrounds. There are no changes in the cerebrospinal fluid, the pressure of which is not increased. Ventriculograms are always normal. In only one case did the papilledema recur. (13 references.) Ralph W. Danielson.

Dvorzetz, M. A. **Symptoms of Van der Hoeve and Birch-Hirschfeld in rhinogenic inflammation of the optic nerve.** Viestnik Opht., 1939, v. 15, pt. 1, p. 105.

A total of 172 patients with inflammation of the various sinuses were subjected to a very thorough and exhaustive ophthalmologic examination, with the purpose of demonstrating involvement of the optic nerve and retina. Ob-

jective signs, varying from hyperemia to atrophy of the disc, were found in 36 cases, and in 10 of these there was a definite dilatation of the retinal veins. Restrictions of the visual field were demonstrated in 83 cases, concentric contractions in 26, enlarged blind spot in 23, central scotoma in 11, peripheral scotoma in 9, and combined field defects in 14. Van der Hoeve's claim that enlargement of the blind spot is pathognomonic of involvement of the posterior sinuses is refuted in this material. The condition was found also in diseases of the antrum and frontal sinuses. It is most frequent in disease of the sphenoid sinus, but is not diagnostic of the disease. Less diagnostic still is Birch-Hirschfeld's symptom—central scotoma—which was found in only 7.4 percent of the cases; these included diseases of the antrum, ethmoid and frontal sinuses, middle ear, and mastoids. Ray K. Daily.

Levina, L. C. **The retinal vascular pressure in choked disc.** Viestnik Opht., 1939, v. 15, pt. 1, p. 54.

The material consisted of 36 cases of choked disc and 12 cases of intracranial tumor with normal fundi. The conclusions are that the retinal arterial pressure varies with the phase of the choked disc. Lowered arterial pressure with advanced choked disc is caused by the pressure of the edematous tissue on the vessels. Raised diastolic retinal arterial pressure without general hypertension is an indication of raised intracranial pressure. A difference in the retinal arterial pressure of the two sides may be a valuable localizing sign in intracranial neoplasm.

Ray K. Daily.

Lijo Pavia, J., and Victoria, M. **Papilledema and chickenpox.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 563-567.

Case report on bilateral papilledema as a sequela of chickenpox in a child nine years of age. Two similar cases reported in the literature are mentioned. The authors believe this to be a syndrome characterized by: (1) cephalorrhachidian hypertension, (2) papilledema, (3) absence of signs of inflammation in the spinal fluid, and (4) slight meningeal irritation due to a serous meningitis. In the case here reported, complete recovery followed withdrawal of 8 c.c. of spinal fluid and intravenous injections of 25-percent glucose solution. In the discussion of this paper, Carlos Gama did not agree with the authors as to the pathogenesis of the disease, believing that the syndrome is produced by some disease of the nervous tissue itself, more likely an encephalitis than a serous meningitis.

Ramon Castroviejo.

Moore, J. E., and Woods, A. C. **The pathology and pathogenesis of syphilitic primary optic atrophy.** Amer. Jour. Ophth., 1940, v. 23, Jan., pp. 1-40; also Amer. Jour. of Syph., Gonorrhea, and Venereal Dis., 1940, v. 24, Jan., p. 59.

Popov, M. Z. **The rhythmic amplitude of the brain and choked disc.** Viestnik Opht., 1939, v. 15, pt. 1, p. 14.

In 1938 Popov took the position that choked disc is not caused directly by increased intracranial pressure but by diminished amplitude of the cerebral pulsation. In this article he analyzes the data of 450 neurosurgical case histories. The findings support his contention, and he concludes that choked disc is the result of a disturbance in the hydrodynamic currents in the optic nerve and cranium. The fundamental

factor in the maintenance of the normal relations is the amplitude of the rhythmic movement of the brain acting as a suction on the centripetal currents within the optic nerve; intracranial neoplasms produce, in addition to an increase in the intracranial contents, a swelling and edema of brain substance and a stasis of the cerebrospinal fluid. The result is a diminution in the potential elasticity of the brain, and a disturbance in the amplitude of its rhythmic movements. In cases where increased cerebrospinal-fluid pressure was not associated with a disturbance in the pulsations of the brain no choked disc was found. Choked disc occurred only in those cases in which the pulsation was diminished or eliminated. The basis of choked disc is thus a disturbance in brain function.

Ray K. Daily.

Strauss, I., and Needles, W. **Optic-nerve complications of accessory nasal sinus disease.** Ann. Otol., Rhinol., and Laryng., 1938, v. 47, Dec., p. 989.

The authors (neurologists) present this paper from the Neurological Service at Mount Sinai Hospital. A review of the literature is followed by fourteen case reports, seven of which seem to be of fairly typical rhinogenic optic neuritis. The differential diagnosis from multiple sclerosis, hereditary optic atrophy, neoplasms, syphilis, and toxic and infectious causes, is given. The theory of pressure in the optic canals (especially the small ones) is discussed at some length as is the theory of Gradle wherein the optic neuritis is presumed to be caused by drainage from the sinuses into the vein of Vossius. The authors conclude that, while many cases eventually turn out to be multiple sclerosis and other cases seem to recover from rather minor procedures, nevertheless in some cases operative intervention is indicated. (16 references.) Ralph W. Danielson.

12

VISUAL TRACTS AND CENTERS

Athens, A. G. **Neuromyelitis optica.** Amer. Jour. Ophth., 1939, v. 22, Dec., pp. 1360-1364.

Borsotti, Ippolito. **Considerations of a case of homonymous hemianopsia after alcoholization of the gasserian ganglion.** Riv. Oto-Neuro-Oft., 1938, v. 15, Sept.-Oct., pp. 408-427.

A man 48 years of age was given an injection of 2 c.c. of alcohol in the region of the right gasserian ganglion as treatment for a violent recurrent neuralgia of the periorbital region of the same side. Following the injection he developed total anesthesia of the territory supplied by the right trigeminus, complete oculomotor paralysis, left homonymous hemianopsia, and neuroparalytic keratitis. In order to determine the origin of the hemianopsia, a unique occurrence after such procedure, the writer performed some experiments on cadavers to find the route taken by fluids in the cranial base when forced through the Meckel cavity. In none of the experiments did the fluids reach the optic pathways. The writer concludes then that in his patient there existed special predisposing anomalous anatomic conditions which allowed the injected material to reach the right optic tract. (Bibliography, 7 figures.) M. Lombardo.

Bozzi, Riccardo. **Clinical contribution to the study of fourth-ventricle tumors.** Riv. Oto-Neuro-Oft., 1938, v. 16, July-Aug., pp. 331-335.

For two years a girl of 14 years had been suffering from attacks of left

frontal headaches, vomiting, and dizziness, and more recently from occipital headaches, dyspnea, and opisthotonos. Special eye symptoms were bilateral papilledema and paresis both of convergence and of vertical movements of the eyes. A postmortem examination revealed a large gliomatous tumor connected with the floor of the fourth ventricle and the median lobe of the cerebellum. The third and lateral ventricles were dilated. The writer remarks that a Parinaud syndrome not previously described in connection with tumors of the fourth ventricle was evident. This syndrome was the result of changes in fluid circulation which provoked dilatation of the ventricles and subsequent compression atrophy of distant brain structures. (Bibliography.) M. Lombardo.

Chermely, Hubert. **Pathologic changes of the optic center due to blindness in one eye.** Szemészet, 1939, v. 2, June, p. 18.

The author examined the brain of a 45-year-old man who suffered from tabes dorsalis and who had become blind in the right eye from panophthalmitis 24 years before. Atrophic areas in the corpora geniculata externa proved Minkowski's contention that the crossed and uncrossed fibers are arranged in alternating layers. Contrary to Minkowski's findings, however, the author found no atrophic changes in the area striata of either side. He therefore believes that blindness must exist several decades before atrophic changes in the cortex set in.

R. Grunfeld.

Chiasserini. **Pathology and therapy of neurohypophyseal syndromes.** Riv. Oto-Neuro-Oft., 1938, v. 15, July-Aug., pp. 363-376.

The speaker discusses the symptomatology, diagnosis, and pathology of traumatic lesions of the hypophyseal region; sellar and parasellar aneurysms, inflammations of the sellar region, tumors of the hypophysis, craniopharyngiomata, tumors of the third ventricle, and chronic hydrocephalus. Special reference is made to arteriography, encephalography, ventriculography, and different methods of medical and surgical treatment. M. Lombardo.

Guglielmo, di. **Diagnosis and therapy of sellar and parasellar syndromes.** Riv. Oto-Neuro-Oft., 1938, v. 15, July-Aug., pp. 353-362.

The author speaks of direct and differential diagnosis, based on clinical, radiologic, and ocular symptoms, of the pathologic processes giving intrasellar and juxtasellar syndromes. The different processes developing in the sella, in near structures, in the brain, and in extracranial organs are considered. Medical and surgical methods of treatment and their indications are discussed. M. Lombardo.

Hyndman, O. R. **The central visual system: evidence against bilateral representation through the splenium of the corpus callosum.** Arch. of Neurol. and Psychiatry, 1939, v. 42, Oct., p. 735.

Hyndman reports a case to show that the splenium of the corpus callosum plays no role in the retention of central vision. He states that central vision is probably in part represented anteriorly to the accepted visual cortex and not bilaterally.

Theodore M. Shapira.

Karbacher, P., and Schinz, H. R. **Eye symptoms of patients with tumors of the hypophysis at the eye clinic and**

the Roentgen Institute of Zurich, 1924-1939. Klin. M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 541.

In the last 15 years, 27 cases of tumor of the hypophysis were sent to the Institute. Four types were distinguished: basophile adenoma with adiposis, eosinophile adenoma with acromegaly, dystrophia adiposo-genitalis, and sellar brain tumor without marked endocrine symptoms. Twelve cases belonging to the last group are described in detail. Ophthalmoscopic changes of the disc were marked, but even in atrophy of the optic nerve vision remained normal for a long time. Visual fields are given. Operative treatment should always be followed by radiation.

C. Zimmermann.

Krayenbuehl, H. **Significance of visual-field studies in diagnosis of temporal and occipital-lobe tumors.** Schweizer med. Woch., 1939, v. 69, Oct. 28, p. 1028.

The author presents three cases of brain tumors all of which were localized by careful visual-field examinations. The first case was that of a protoplasmic astrocytoma of the left temporal lobe with a homonymous upper right quadrant defect. After operation, X-ray treatment gave temporary improvement, but the patient died one year later. The second case was that of a paraventricular multiform glioblastoma in the right occipital lobe with a homonymous upper left quadrant defect. This patient was operated upon and after X-ray treatment there was considerable improvement. The third case was a cystic astrocytoma of the temporal lobe with a right-sided homonymous hemianopsia. X-ray treatment after operation was followed by considerable improvement. The author states that in all three cases study of the visual fields was an important aid in localizing the tumors. He suggests that fields be taken on the Bjerrum screen at a two-meter distance with small targets up to 3 mm. in diameter. He concludes that in temporal-lobe and occipital-lobe tumors the most usual finding is a homonymous hemianopsia. Three excellent ventriculographic photographs are included.

Theodore M. Shapira.

Leinfelder, P. J. **Unilateral loss of vision in neurological disease.** Amer. Jour. Ophth., 1939, v. 22, Dec., pp. 1337-1342.

Raverdino, Emilio. **The importance of ophthalmoscopic signs before and after operative procedures for intracranial tumors.** Riv. Oto-Neuro-Oft., 1938, v. 15, Nov.-Dec., pp. 532-543.

A girl of 17 years with greatly reduced vision in the right eye and blindness in the left and suffering from headache and vomiting, showed a right papilledema of 3-mm. elevation, with papillary and peripapillary edema on the left side. An astrocytoma was removed from the left frontal lobe. Improvement of vision was only slight, due probably to an atrophic state of the optic nerves. A woman of 40 years who presented a slight ptosis of the left upper lid, vision of 1/10 in both eyes, and pale papillas, showed at radiography an eroded and decalcified lamina quadrilatera. The sellar cavity was found filled with a soft pinkish mass (chromophile adenoma), which was curetted away. The vision of the right eye improved to 10/10 and of the left eye to 6/10. Papilledema disappeared in both cases after decompressive therapy by lumbar punctures. In his discussion the writer emphasizes the importance of ocular findings, which appear before other general symptoms,

and the necessity of postoperative decompressive therapy in order to avoid the deleterious effects of papilledema resulting from irritation of the choroidal plexuses by operative trauma. (8 figures.) M. Lombardo.

Rubino, A. **Two cases of intracranial tumor with special ocular symptomatology.** Riv. Oto-Neuro-Oft., 1938, v. 15, Nov.-Dec., pp. 477-487.

A woman of 48 years affected by a meningioma of the left lesser wing of the sphenoid, and a woman of 37 years affected by a meningioma of the olfactory fossa both showed central and other defects of the visual fields, and a peculiar aspect of the optic discs consisting of binasal edema and bitemporal atrophy. Ventriculography in the first case and encephalography in the second case suggested the seat and nature of the pathologic processes which were confirmed at operation. (17 figures.) M. Lombardo.

Zondek, Hermann. **The question of retrogression of bitemporal hemianopsia under internal therapy.** Acta Ophth. Orientalia, 1938, v. 1, Dec., p. 88.

A 37-year-old woman complained of increase of weight, absent libido, depression, and palpitation. On examination a bitemporal constriction of the field of vision, particularly for colors, was found. X-ray examination revealed a deep and deformed sella turcica. Following dehydration therapy the constriction of the visual field practically disappeared. A menstruation anomaly and the psychic condition remained uninfluenced. The author believes that abnormal swelling of the tissues in the vicinity of the optic chiasm caused the ocular disturbances which were favorably influenced by the dehydrating therapy. R. Grunfeld.

13

EYEBALL AND ORBIT

Bair, H. L. **New enucleation scissors combined with hemostat blades.** Arch. of Ophth., 1939, v. 22, Sept., pp. 449-450.

Hemostat blades are added to the convex sides of the blades of the scissors, both being operated by the same handle. The hemostat blades close slightly before the scissors.

J. Hewitt Judd.

Borley, W. E. **Dermoid (oil) cyst of the orbit.** Amer. Jour. Ophth., 1939, v. 22, Dec., pp. 1355-1359; also Trans. Western Ophth. Soc., 1939, 6th mtg.

Burch, F. E. **Evisceration of the globe with scleral implant and preservation of the cornea.** Amer. Jour. Ophth., 1940, v. 23, Jan., pp. 47-51; also Trans. Amer. Ophth. Soc., 1939, v. 37.

Ginsburg, S. **Postoperative progressive exophthalmos with low basal metabolic rate.** Ann. Intern. Med., 1939, v. 13, Sept., p. 424.

The author reviews the literature of postoperative exophthalmos and reports a case. He concludes that: (1) The basic cause of exophthalmic goiter remains unknown. (2) Exophthalmic goiter is not synonymous with hyperthyroidism; it may manifest itself with either a normal or a minus basal rate. (3) The most frequent pathologic findings in progressive exophthalmos have been those of an inflammatory condition of the orbital cellular tissues and hypertrophy or atrophy and degeneration of the extraocular muscles. (4) Early use of radiation therapy in combination with medical treatment is advised. If it fails, the Naffziger operation should be considered in severe progressive exophthalmos.

Theodore M. Shapira.

Gözberk, Rifat. **Two cases of congenital facial hemihypertrophy with ocular anomaly.** Ann. d'Ocul., 1939, v. 176, Aug., pp. 624-630.

The literature of this disease is reviewed briefly and two additional cases are reported. The condition is congenital but not hereditary, and the mechanism of its development is unknown although at least five explanatory theories have been advanced. Facial hemihypertrophy consists of enlargement of the skeletal and soft tissues of one side of the face. Ordinarily the bony hypertrophy begins under the orbit and no changes in the bones of the cranial vault are noted. The malar bone and both maxillary bones are usually definitely enlarged as can be demonstrated by X ray, and the petrous portion of the temporal bone is also sometimes enlarged. Frequently ptosis and narrowing of the palpebral fissure are seen. The cheek and lobe of the ear are increased in size as is the corresponding half of the nose. The lips and chin are usually thickened on the affected side. The vault of the palate is larger and the tonsil and half of the tongue, all on the same side, are overdeveloped. Teeth on the same side develop three or four years early. Lacrimal secretion and sweating are not affected, but the skin on the involved side is often slightly congested and reddish. Hair is not changed and there is no definite involvement of the nervous system. Sensation, motility, reflexes, and intelligence are all normal. Involvement of the orbital bones as well as increase in orbital fat and size of the extraocular muscles produces exophthalmos. The author describes the enlargement of the eyes as buphthalmos although the presence of normal intraocular tension and the absence of infantile glaucoma might suggest megalophthalmos as a more suitable term. Diagnosis is not difficult. The condition is almost the direct opposite of facial hemiatrophy. Congenital elephantiasis of the lids and the chronic familial trophic edema of Meige must be differentiated.

John M. McLean.

Jaensch, P. A. **The double eye. Remarks on the article by Weckert (Graefe's Arch., 1939, v. 140, p. 372).** Klin. M. f. Augenh., 1939, v. 103, July, p. 70.

The term "double eye" corresponds to the "middle imaginary eye" of Hering and the "cyclopic eye" of Helmholtz. The doctrine of identical points is based on it. The author shows in detail that the new hypothesis of Weckert (see below) does not refute our present views.

C. Zimmermann.

Krueckmann, E. **A procedure for evisceration.** Deutsche Ophth. Gesell., 1938; in Klin. M. f. Augenh., 1938, v. 101, July, p. 108.

The aim is to preserve, for the greater part, the function of the extrinsic ocular muscles. The conjunctiva is dissected to about 1 cm. from the limbus all the way around, and the tendinous insertions of the four recti muscles are undermined. A silk suture is carried through some of the tendon layers in such a way that each muscle is partly on top of and partly underneath the suture, and the ciliary vessels are compressed as little as possible when the suture is tied. The cornea is cut away sharply at its margin, the contents of the globe spooned out, and the inner surface of the sclera scraped clean. The portions of the sclera lying between muscle ends are cut away so as to allow further inspection of the

scleral inner wall and the complete removal of all remaining uveal tissue. A catgut suture is passed through the sclera from in front of the insertion of one vertical muscle to the corresponding point of the other, and a similar suture is inserted for the horizontal muscles. The sutures are tied so as to allow a very small gap, and the original silk sutures through the muscle insertions are tied in the same way. The operation is contraindicated in cases of malignant growths, tuberculosis, sympathetic ophthalmia, and extensive dense scars in the interior of the globe.

Percy Fridenberg.

Lemere, H. B. **Dilatation of conjunctival sac in anophthalmos.** Arch. of Ophth., 1939, v. 22, Sept., pp. 450-451.

A case is reported to show the marked enlargement of the conjunctival sac obtained after eight months of dilatation by insertion of dental stents which were gradually increased in size. J. Hewitt Judd.

Machado, Nicolino. **Orbital abscesses.** Trahalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 643-655.

Report of four cases of orbital abscess. The first one arose from an ethmoidal and maxillary sinusitis, the second from a frontal and ethmoidal sinusitis, the third from a wooden foreign body, and the fourth from injury in the frontal region. All were successfully treated by early surgical intervention, consisting of incisions through the skin of the lids varying in location according to the location of the abscess. The importance of taking such action as soon as the diagnosis has been made is stressed by the author. Differential diagnosis is briefly discussed.

Ramon Castroviejo.

Schläpfer, H. **Dyscephaly (dysostosis craniofacialis or Crouzon's disease) in two sisters.** Klin. M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 469.

A familial occurrence of dyscephaly in two sisters of a family of five is described. Vogt observed as the first change a hypoplasia of the intermaxillary bone. C. Zimmermann.

Smith, J. W. **Meningioma producing unilateral exophthalmos; syndrome of tumor of the pterional plaque arising from the outer third of the sphenoid ridge.** Arch. of Ophth., 1939, v. 22, Oct., pp. 540-549.

The syndrome of pterional meningioma en plaque consists of (1) slowly progressive, painless, nonpulsating, and unilateral exophthalmos; (2) normal vision, fields, and eyegrounds; (3) suprazygomatic fullness; (4) roentgen findings of hyperostosis involving the sphenoid ridge, the greater and lesser wings of the sphenoid bone, the roof of the orbit, and the area where the frontal and parietal bones articulate with the greater wing of the sphenoid bone (pterional region); (5) occurrence usually in a female of middle age; and (6) greater incidence of the tumor on the left side. A woman aged 53 years presented a unilateral exophthalmos, present for about nine months. Through a low, lateral, frontotemporal flap a hyperostotic area was excised, and a pterional meningioma en plaque was removed under local anesthesia. Two months later the vision was 20/20, and the visual fields showed only the temporal contraction of ten degrees which was present before the operation. The article is illustrated by photographs of the patient before and after the operation, and photomicrographs of the tumor. J. Hewitt Judd.

Thiel, R. **Polyviol inserts for plastic formation of the stump after enucleation of the eye.** Klin. M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 530.

The physiologic and chemical properties of the substance known by the trade name of Polyviol are discussed in detail. These inserts undergo practically no change. Thiel implanted them into Tenon's capsule after enucleation, and in the majority of cases a good cosmetic result was obtained.

C. Zimmermann.

Torres, Gastao. **Antiluetic therapy in exophthalmos.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 658-668.

Case report of exophthalmos of the left eye in a patient 56 years of age with ectropion, chemosis, pronounced edema of the lids, turbidity of transparent media, and diminished motility of the globe. Coinciding with the exophthalmos, the patient had an abdominal tumor. The case completely recovered under antiluetic treatment. Differential diagnosis of the various types of exophthalmos is discussed. The author advocates Argañaraz's procedure of instituting antiluetic treatment before surgical intervention in cases of exophthalmos, claiming that in some cases of apparent tumor of the orbit surprising cures have been obtained. Ramon Castroviejo.

Torrini, U. L. **Orbital cellulitis in infancy.** Riv. Oto-Neuro-Oft., 1939, v. 16, March-April, pp. 129-131.

Five cases are reported of orbital cellulitis which recovered under medical treatment. The disease had manifested itself in children of from one to six years of age as a complication of an acute influenzal rhinoethmoiditis with severe local and general symptoms. The writer resorted several times a day to aspiration of the corresponding nasal fossa from which a mucous or mucopurulent secretion was drained. From the first aspiration the process appeared to be arrested, and regression of the local and general symptoms with complete recovery was assured in six or seven days. M. Lombardo.

Valerio, Mario. **A rare case of malformation of the eyelid, brow, skin, capillaries, and globe.** Ann. di Ottal., 1939, v. 67, Sept., p. 704.

The author describes the case of a young woman with no history of hereditary disease or consanguinity, who presented a palpebral coloboma and defects in the eyeball and the brow, including a dermoid tumor of the limbus, a subconjunctival lipoma, and an anomalous tuft of skin capillaries near the brow. (2 plates, bibliography.)

Park Lewis.

Weckert, F. **The two eyes as one organ.** Graefe's Arch., 1939, v. 140, pt. 2, pp. 372-378.

The author discusses the question of the visual apparatus as a unit, with special reference to the problem of fusion and strabismus.

Charles A. Perera.

Ziporkes, Joseph. **Melanosis oculi.** Arch. of Ophth., 1939, v. 22, Oct., pp. 670-671.

This uncommon congenital defect, found in a girl aged 17 years, is described and illustrated by a colored plate. It is the result of an excessive pigmentation in the mesoblastic layers encircling the secondary optic vesicle. The discoloration in the sclera is due to pigmentation in the superficial layers, not to thinning of the sclera. The small, hemispheric elevations on the iris are attributable to hyperplasia of the surface endothelium with prolifera-

tion of pigment in the chromatophores. The posterior pigment epithelium of the iris is normal in these cases.

J. Hewitt Judd.

14

EYELIDS AND LACRIMAL APPARATUS

Alamilla, Gustava. **Syphilitic chancre of the lid.** Rev. Cubana de Oto-Neuro-Oft., 1938, v. 7, Nov.-Dec., p. 137.

Case report of a primary lesion of the right lower lid of an 18-months-old child, confirmed by dark-field examination. The literature of extragenital chancre is briefly reviewed.

Edward P. Burch.

Andrade, Cesario de. **Palpebral edema in certain general morbid states.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 827-829.

The author comments briefly on the different systemic conditions that are manifested in the eyelids in the form of edema. Ramon Castroviejo.

Barroso, S. A. **Treatment of affections of the lacrimal sac by stricturotomy.** Trabalhos do Premeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 577-589.

Disorders of the lacrimal apparatus are briefly discussed with regard to anatomy, etiology, pathology, diagnosis, and treatment. Excision of the lacrimal sac and dacryocystorhinostomy of Dupuy-Dutemps are briefly mentioned. The technique of the stricturotomy operation advocated by Poulard is described in detail. Statistics of Poulard are given, in which out of 517 patients, 495 cures are recorded.

Ramon Castroviejo.

Georgiadès. **Resorption granulomas of the lids and conjunctiva.** Ann. d' Ocul., 1939, v. 176, Sept., pp. 675-701.

The author groups under the title "resorption granulomas" many diverse ocular responses which are not definitely related to syphilis, tuberculosis, or trachoma, but which histologically show giant cells and a picture related to the common foreign-body reaction of most tissues. He finds that many substances produce granulomatous lesions in the lid or conjunctiva with either nodules of various sizes or more diffuse swelling, but he does not believe that these can be diagnosed without histologic study. Among the possible etiologic factors are grouped: exogenous irritants, such as bits of metal, pieces of wood, hairs, catgut or silk sutures, vegetable debris, cereal grains, particles of powder, grains of insoluble chemical substances, and caterpillar hairs (with their typical ophthalmia nodosa); endogenous irritants derived from various degenerative processes (amyloid, hyaline, colloid, and calcareous); products of general metabolic disturbances, such as gouty tophi; and necrotic products from trauma, neoplasia, or infection.

John M. McLean.

Gumperz, R., and Stern, H. J. **Anastomosing operations on the lacrimal sac.** Acta Ophth. Orientalia, 1939, v. 1, April, p. 142.

The authors strongly condemn simple extirpation of the lacrimal sac from the outside, and insist that a well-functioning anastomosis should be made to restore physiologic conditions as nearly as possible. R. Grunfeld.

Myckamedova-Krataeva, G. D. **Forced dilatation of the osseous nasolacrimal duct in epiphora.** Viestnik Opht., 1939, v. 15, pt. 1, p. 98.

For the relief of obstinate epiphora the author finds forceful dilatation of

the lacrimal duct after slitting the upper canaliculus very effective.

Ray K. Daily.

Szász, Alexander. **Operative procedure for partial trichiasis.** Szemészet, 1939, v. 2, June, p. 13.

The author claims that Ditroi's technique is suitable for partial entropion as well as for trichiasis. By an intermarginal incision the skin is separated from the tarsus for a distance at least 2 mm. longer than the size of the entropic lid portion. The skin is undermined, an oval flap of skin about 15 mm. above the lid margin is excised, and the edges of the wound are sutured together. R. Grunfeld.

Valerio, Mario. **A rare case of Marcus Gunn's phenomenon.** Riv. Oto-Neuro-Oft., 1938, v. 15, Nov.-Dec., pp. 488-509.

A man of 28 years showed, when at rest, a drooping of the left upper lid to such a degree that it covered several millimeters of the pupillary area of the cornea. On covering the eyes the affected lid did not show any movement, but on opening the mouth the lid moved suddenly upward to the normal level. This movement became more marked when the patient moved the lower jaw to the right and tightened his teeth thus contracting his right masseter muscle. The writer discusses different hypotheses on the pathogenesis of the phenomenon, and methods of treatment. (Bibliography, 4 figures.)

M. Lombardo.

Venco, Luigi. **Indications, complications, and results of dacryocystorhinostomy.** Riv. Oto-Neuro-Oft., 1938, v. 15, Nov.-Dec., pp. 510-531.

Basing his opinion on a study of 200 operations performed at the Royal Ophthalmic Clinic of Pavia, the writer maintains that dacryocystorhinostomy can be performed in almost all cases of dacryocystitis. It is to be preferred to dacryocystectomy. (Bibliography, 6 figures.) M. Lombardo.

Verderame, F. **Contribution to surgical correction of traumatic epicanthus.** Klin. M. f. Augenh., 1939, v. 103, v. 103, Oct.-Nov., p. 436.

In a case of traumatic cicatricial epicanthus the operation consisted in excising the extensive irregular scar and the cicatricially caused epicanthus fold, and undermining and transposing the adjacent skin to cover the defect. A satisfactory cosmetic result was obtained. C. Zimmermann.

Wood, E. H. **Clinical study of transillumination of the eyelids.** Arch. of Ophth., 1939, v. 22, Oct., pp. 608-612.

A special prism transilluminator which fits over the illuminating system of the May ophthalmoscope is described, also the technique of examining the lids by transillumination. This method has been found useful in studying the lacrimal drainage apparatus, chalazion, and injuries of the eyelid, for detection of foreign bodies in the lid, and for differentiating between well-advanced vernal catarrh and trachoma. J. Hewitt Judd.

15

TUMORS

Clark, W. C. **Adrenal neuroblastoma, with particular reference to metastasis to the orbit.** Arch. of Ophth., 1939, v. 22, Oct., pp. 575-580.

The clinical picture of Hutchinson's syndrome of neuroblastoma occurred in three children aged 2, 2½, and 6 years respectively, with ocular findings caused by metastasis to the skull and orbit. Treatment is only palliative,

since the condition is fatal in from one to ten months after the onset. Differential diagnosis rests mainly on the results of biopsy, roentgenogram, and blood studies. J. Hewitt Judd.

Gartner, Samuel. **Malignant melanoma of the choroid and von Recklinghausen's disease.** Amer. Jour. Ophth., 1940, v. 23, Jan., pp. 73-78.

Giri, D. V. **Metastatic carcinoma of the choroid secondary to mammary carcinoma in a man.** Schweizer med. Woch., 1939, v. 69, no. 43, p. 1069.

The condition occurred in a man of 69 years, who complained of decreasing vision for the past three weeks. Detachment of the retina due to a secondary tumor mass was diagnosed. Although no autopsy was done, the breast had a clinical appearance of carcinoma. The eye was sectioned and showed a typical spheroidal-cell carcinoma.

Theodore M. Shapira.

Klien, B. A. **Diktyoma retinae.** Arch. of Ophth., 1939, v. 22, Sept., pp. 432-438.

Fuchs first suggested the name of diktyoma for a group of rare tumors arising from the pars ciliaris retinae, because their main characteristic was the production of membranes resembling the embryonic retina. These tumors are characterized by onset in early life, the flat growth of the tumor which tends to line open surfaces rather than fill cavities, the malignant character, and the complexity of the histologic structure. The case of a boy aged six years is discussed. The histology is reported in detail and illustrated by photomicrographs. Some of the changes in the tumor, such as the presence of true cartilage and the membranes and tubules of pigmented epithelium, are analogous to those occasionally found in microphthalmic eyes. This growth is the counterpart of the retinoblastoma of the pars optica retinae. J. Hewitt Judd.

Nechaeva, E. A. **Pathologic anatomy and therapy of sarcoma of the iris.** Viestnik Opht., 1939, v. 15, pt. 1, p. 73.

A report of a ring-sarcoma of the iris in the angle of the anterior chamber. Microscopically, it was type B of the Callender and Wilder classification.

Ray K. Daily.

Schinz, H. R. **Hematogenous distant metastases in both eyes in carcinoma of the mammary gland.** Klin. M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 425.

Within the last twenty years 536 cases of carcinoma of the mammary gland were treated at the Roentgen Institute of Zurich. Three showed hematogenous metastases into the choroid, tumor emboli apparently having been transported through the short posterior ciliary arteries. Such metastases may be clinically latent and are probably more frequent than is commonly supposed. C. Zimmermann.

Wheeler, J. M. **Treatment of tumors of the eyelids by surgery.** New York State Jour. Med., 1939, v. 39, May 1, p. 870.

Relatively few lid tumors are prone to metastasize. However, in those with malignant tendencies local eradication should be performed promptly. Radiation about the eyelids should be avoided because of complications. While surgery offers the best means of ridding lids of tumors, their removal may cause defects, which should be corrected by proper plastic repair. There are several drawings and a

photograph illustrating certain tumors and some steps in the technique of lid plastic surgery. F. M. Crage.

16

INJURIES

Adamantiadis, B. **Industrial keratopathy of marble cutters and polishers.** Ophthalmologica, 1939, v. 97, Aug., p. 351. (See Amer. Jour. Ophth., 1939, v. 22, Dec., p. 1424.)

Cogan, D. G. **Tetanus and the prophylactic use of antitoxin following injuries of the eye.** Amer. Jour. Ophth., 1939, v. 22, Dec., pp. 1365-1367.

Gailey, W. W. **Transient myopia from sulphanilamide.** Amer. Jour. Ophth., 1939, v. 22, Dec., pp. 1399-1400.

Haab, O., and Schnetzler, A. **A new model of Haab's eye magnet.** Schweizer, med. Woch., 1939, no. 34, Aug., p. 767.

The authors describe an improved Haab magnet which weighs less and is smaller than the 1895 model, but has increased magnetic power.

Theodore M. Shapira.

Horner, W. D. **Penetrating injuries of the globe from spectacle glass.** Arch. of Ophth., 1939, v. 22, Sept., pp. 439-445.

Four cases of serious monocular injury from broken spectacle lenses are presented. Only one eye retained useful vision. Panophthalmitis did not develop probably due to the use of foreign protein. Blood-staining occurred in one cornea. Roentgenograms will detect glass spicules as small as 1.5 by 2 mm., especially if the foreign body is in the anterior portion of the eye so that the skeleton-free method of Vogt can be used.

J. Hewitt Judd.

Ritter, A., and Luessi, U. **The importance of surgical and ophthalmologic coöperation in head injuries.** Schweizer med. Woch., 1939, v. 69, Oct. 28, p. 1039.

The authors, by citation of cases, show the importance of early ophthalmoscopic examination in head and skull injuries, even though the patients are unconscious. They state that eye check-ups should be the rule after head injuries and that the examination should be done without drug mydriasis. The indication for operative decompression of an injured optic nerve in the bony optic canal is discussed on the basis of the authors' own observation. They conclude that it appears best to withhold operative measures.

Theodore M. Shapira.

Sherman, E. S. **Intraocular foreign bodies.** Amer. Jour. Ophth., 1939, v. 22, Dec., pp. 1368-1377.

Veil, P., and Desvignes. **Experimental studies on the effect of aseptic foreign bodies in the eye.** Ann. d'Ocul., 1939, v. 176, Aug., pp. 577-586.

Experiments on rabbit eyes seemed to indicate that most aseptic intraocular foreign bodies, except mercury, copper, and nickel are well tolerated. Foreign bodies placed experimentally in the iris or ciliary body were either well tolerated or extruded. The effect of size and shape of the foreign bodies was not determined. All of these experiments were carried on over a relatively short space of time. The authors caution against assuming that the human eye will exhibit tolerance similar to the rabbit eye, and they also call attention to the delayed reaction in the human eye to foreign bodies retained for a long period of time.

John M. McLean.

17

SYSTEMIC DISEASES AND PARASITES

Andrade, Cesario. **Certain aspects of ocular tuberculosis.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 595-604.

The author discusses briefly the present status of ocular tuberculosis and reports four cases. The first case was of primary tuberculous uveitis in which the infection was carried to the uveal tract through a corneal injury; the second, a polypoid tuberculosis of the upper tarsal and bulbar conjunctiva; the third, a tuberculous neurochoroiditis; and the fourth, tuberculosis of the lacrimal gland.

Ramon Castroviejo.

Duggan, J. N., and Chitnis, V. K. **Ocular lesions caused by focal infection.** Acta Ophth. Orientalia, 1938, v. 1, Dec., p. 78.

Description of three cases with ocular lesions due to focal infection, which healed after removal of the foci. The authors discuss the problem of focal infection. The secondary infection in the eye may be caused by microörganisms carried there from the focus by the bloodstream, by toxins liberated from the microörganisms, or by liberated foreign proteins resulting in allergic sensitization in the eye.

R. Grunfeld.

Herzog, Max. **Ophthalmologic aspect of the modern treatment of postencephalitic parkinsonism (Bulgarian cure).** Arch. of Ophth., 1939, v. 22, Oct., pp. 669-670.

The Bulgarian treatment consists of the administration by mouth of a percolate of the root of the belladonna plant supplemented by gymnastic and dietetic measures. The treatment must be continued for many years, usually until the patient's death. Since it is given in large enough doses to produce cycloplegia, it is interesting to note that several hundred patients have been treated in one German institution without the occurrence of glaucoma. Reports are very optimistic.

J. Hewitt Judd.

Markovic, Acim. **The first case of human ocular philophthalmosis.** Graefe's Arch., 1939, v. 140, pt. 3, pp. 515-526.

The author reviews the literature dealing with the rare examples of trematode parasites in the human eye. Philophthalmus is found in different climates as a specific eye parasite of birds. The case reported was of a 28-year-old male inhabitant of Belgrade whose left eye presented the picture of an acute follicular conjunctivitis resembling acute trachoma. The conjunctival sac of the involved eye contained a worm, identified as philophthalmus lacrymosus Braun. Removal of the parasite resulted in rapid disappearance of the ocular inflammation. The patient had been bathing in the Sava river near Belgrade. Since the life cycle of this parasite is unknown, it is not clear whether the infection was caused by the mature parasite or a larval form. Up to the present time, philophthalmus lacrymosus Braun has been found only once in Brazil, and then under the nictitating membrane of a gull (Larus maculipennis). The author searched for the parasite in gulls near Belgrade, and found it twice in the conjunctival sac of Larus ridibundus; it produced no reaction.

Charles A. Perera.

Poser, Edouard. **Vitamin B_1 re visual perception.** Illinois Med. Jour., 1939, v. 75, March, p. 280.

The author reports a case presenting amblyopia, diplopia, vertigo, pain during some ocular movements, and contraction of the visual fields. The patient was a female 53 years of age. Her diet was inadequate, particularly in vitamins. After one week of parenteral administration of vitamin B_1 in two doses of 100 mg. each, the symptoms disappeared, and the vision improved from 20/200 in each eye to 20/40 in one and 20/20 in the other.

F. M. Crage.

Rohrschneider, W. **Ocular and pulmonary tuberculosis; negative tuberculin skin-reaction.** Deut. Ophth. Gesell., 1938; in Klin. M. f. Augenh., 1938, v. 101, July, p. 101.

Report of four cases characterized by bilateral iridocyclitis with nodules and precipitates. X ray of the chest showed enlargement of the mediastinal lymph-glands and a delicate netlike shadow reaching mainly from the hilus shadow to the middle and lower fields. The pulmonary lesions showed a tendency to regress. The cases are regarded as presenting a relatively symptomless form of a large clinical group which has been reported in the literature under various names. In addition to the ocular and pulmonary symptoms mentioned, and the negative tuberculin skin reaction, the complete picture shows changes in the osseous structures, and skin lesions in the form of Boeck's benign miliary lupoid. A negative Mantoux test is very important in the detection of these atypical forms.

Percy Fridenberg.

Voelkel. **Ocular tuberculosis in childhood.** Deut. Ophth. Gesell., 1938; in Klin. M. f. Augenh., 1938, v. 101, July, p. 102.

Report of 12 cases under observation for seven months in the eye sanatorium at Hoechenschwand. Eight showed signs of an exudative-lymphatic diathesis, including enlarged tonsils and adenoids, swollen lymph glands in the neck and at the elbow, and a dry, rapidly evanescent eczema. In two cases there was a generalized severe scrofulosis. The mediastinal glands gave positive X-ray pictures much more frequently than they usually do in the adults.

In all cases there was marked constitutional debility. The ocular lesions were almost uniformly exudative. After a purely climatic course of treatment, four children went on to cure and two were improved, while in only one was there a continuation of the intraocular disease process. The chronic relapsing forms also showed a definite relationship to the constitutional condition. Successive relapses, which at times involved cervical glands and joints, were interpreted as due to diffusion by the blood stream. In spite of the marked improvement in these cases a favorable "long term" prognosis is dubious.

Percy Fridenberg.

18

HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Alvaro, M. E. **Prophylactic measures for trachoma in different countries.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 731-734.

Prophylaxis of trachoma as carried out in the British and French Empires, Greece, Dutch Indies, Lithuania, Indochina, Italy, and Russia is briefly discussed.

Ramon Castroviejo.

Andrade, Cesario de. **Geographic distribution of trachoma in Bahia.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 741-747.

As the title implies, this is a comment on the distribution of trachoma in the State of Bahia. (Statistics.)

Ramon Castroviejo.

Arruga, H. **A historical document relating to retinal detachment.** Ophthalmologica, 1939, v. 98, Sept.-Oct., p. 1.

Arruga publishes a letter sent by de Wecker to a Brazilian colleague in 1888. In it de Wecker mentions an article written by him on the treatment of retinal detachment. Since this article shows that de Wecker as well as Leber was a precursor of Gonin, and as it was originally published in an ephemeral journal no longer readily accessible, Arruga reprints it in full.

F. Herbert Haessler.

Bidyādhar, N. K. **Suśruta and his ophthalmic operations.** Arch. of Ophth., 1939, v. 22, Oct., pp. 550-574.

Suśruta, who was the world's first surgeon, lived in Hindustan thousands of years before Christ. His Suśruta-Samhitā, written in Sanskrit, furnishes the earliest description of diseases of the eye and their treatment. He was the first surgeon to introduce the use of bandages and suturing with horsehair. His ocular therapy was very exhaustive and his technique of scarification, excision, incision, and venesection stands comparison with any of the modern methods of operative treatment. He was the world's first surgeon to do lens couching for cataract. His operative treatment for the surgical removal of pterygium and correction of trichiasis was as perfect as any modern method. His description of the anatomic structures of the eye, and his classification and definitions of the various ocular diseases, are reviewed. He classified ocular diseases not only according to their anatomic basis but according to the different modes of surgical treatment. He described the instruments necessary and the technique involved.

J. Hewitt Judd.

Blessig, E. **Psychologic considerations in ophthalmic practice.** Ophthalmologica, 1939, v. 98, Sept.-Oct., p. 34.

In this lecture, prepared for younger colleagues, Blessig discusses such problems as how and when one tells a patient that he has incipient cataract or that he is permanently blind. He also discusses the effect of such psychic factors as will, energy, and hope on the course of disease, and emphasizes the fact that it is not enough to give patients scientific and technical treatment alone. The article is full of useful advice, particularly as to the management of glaucoma and cataract patients.

F. Herbert Haessler.

Brasil do Amaral, N. M. **Impressions of the ophthalmologic meeting in Chicago.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 593-594.

Brief report upon the activities of the 1938 meeting of the American Academy of Ophthalmology and Otolaryngology in Chicago.

Ramon Castroviejo.

Comberg. **New procedure for examination of vision with lowered illumination and of sensitivity to dazzling.** Deut. Ophth. Gesell., 1938; in Klin. M. f. Augenh., 1938, v. 101, July, p. 96.

Comberg has developed a procedure to be used especially in the examination of aviators, motor-truck drivers, seamen, and locomotive engineers. He has purposely departed from the method of testing light adaptation and dark adaptation, which wastes valuable time. Using a Zeiss apparatus con-

structed to his specifications, vision is tested after light adaptation following a period of markedly lowered illumination. Immediately afterward, sensitivity to dazzling is tested, the amount of glare being made to correspond to driving conditions. The test does not take more than six minutes, so that the procedure can be applied to fairly large groups of professional workers.

Percy Fridenberg.

Crisp, W. H. **The psychologic problem in the detection of malingering.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 575-578.

The author stresses the importance of using a friendly approach with compensation cases suspected of malingering. The different tests routinely used in this type of case are briefly mentioned. No matter how well prepared to mislead the physician the suspected malingerer is, sufficient proof of his bad faith can usually be accumulated by careful examination. As soon as proof of malingering has been secured the patient may be told that sufficient data have been obtained for an adverse report unless he is ready to coöperate in the attempt to show how much disturbance has actually resulted from the injury. After this approach the patient will often facilitate a more final analysis of his case. Ramon Castroviejo.

Damel, C. S. **Compensation for 70 percent of visual loss in a lesion of the eye.** Arch. de Oft. de Buenos Aires, 1939, v. 14, Jan., p. 133.

Medicolegal case report (under Argentine law).

Davidson, M. **Traumatic ophthalmoplegias from the viewpoint of compensation in labor accidents.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 569-573.

Among 10,000 cases examined at the Bureau of Workmen's Compensation of the State of New York, Davidson found 71 cases of traumatic external ophthalmoplegias. The author has used and found very effective the Perlia test, as modified by him, for the diagnosis of this type of case. The method is described in detail. Other methods used were the Hess test, the screen test, and diplopia plotting. A brief report is made of the findings in the 71 cases studied by the author.

Ramon Castroviejo.

Del Nero, Valentin. **Statistics of trachoma in the state of São Paulo.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 699-702.

Statistics of 1,336 workers and students examined in the state of São Paulo. Among them 256 cases of trachoma were found, representing about 12 percent of the affected persons.

Ramon Castroviejo.

Ferreira, Helio Goes. **Trachoma in the public schools of Fortaleza.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 705-712.

Statistics of students examined in the public schools of Fortaleza during the years 1930 to 1934.

Ramon Castroviejo.

Florence, Ataliba. **Historic résumé of trachoma in the state of São Paulo.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 703-704.

Comments on the history of trachoma in the state of São Paulo.

Fonseca, Aureliano. **Trachoma in São Paulo.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 713-729.

History and statistics of trachoma in São Paulo are given. Prophylaxis of the disease is briefly discussed.

Ramon Castroviejo.

Kirwan, E. O'G. **The development of ophthalmology in Bengal.** Acta Ophth. Orientalia, 1938, v. 1, Dec., p. 111.

A short review of the progress in ophthalmology made in Bengal from the day the first hospital (Calcutta General Hospital) was established in India in 1790 until today. The present Eye Infirmary of the Medical College has a capacity of 139 beds and an outpatient department of 400 patients daily. More than 50 percent of all cataracts are now removed by the intracapsular method and 90 percent of the operated cases gain normal vision. Corneal transplantations are performed with good results. R. Grunfeld.

Leal, Euthychio. **Prophylaxis of trachoma in São Paulo.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 793-824.

The author advocates formation of an antitrachomatous organization in the state of São Paulo. Suggestions are given in regard to the best ways of carrying out the activities of such an organization. Ramon Castroviejo.

Leal, Euthychio. **Trachoma in the primary schools of São Paulo.** Trabalhos do Primeiro Cong. Brasileiro de Ophth., 1936, v. 2, pp. 751-767.

The author gives statistics of trachoma in the primary schools of São Paulo. Comments are made on the prophylaxis of the disease.

Ramon Castroviejo.

Pfeiffer, R. L. **History of a marble bust of von Graefe.** Arch. of Ophth., 1939, v. 22, Sept., pp. 446-447.

This life-sized bust, which appears to be a duplicate of the head and shoulders of the famous monument in the Charité-Krankenhauses in Berlin, was originally given to Donders by his students and colleagues. Its history previous to the time it was obtained by the author for the Institute of Ophthalmology of the New York Presbyterian Hospital is traced.

J. Hewitt Judd.

Picoli, H. R., Ré, B. V., and Reca, A. **Malingering in ophthalmology.** Arch. de Oft. de Buenos Aires, 1939, v. 14, Jan., p. 1.

An exhaustive study of simulation as encountered by the practicing ophthalmologist is presented by the authors. Since most cases of this nature arise from compensation claims following industrial accidents, the subject is reviewed from this angle. After some general observations on malingering and the conditions which are most likely to be simulated, the essayists consider in detail various traumatic lesions of the eye according to the anatomic part which may be affected. They discuss fully the methods of detecting and unmasking the malingerer, and also the problems of ocular hysteria.

Edward P. Burch.

Schnyder, W. F., and Rehsteiner, K. **Prof. Dr. Alfred Vogt on his sixtieth birthday, October 3, 1939.** Klin M. f. Augenh., 1939, v. 103, Oct.-Nov., p. 353.

Reviews Vogt's life-work.

Weinberg, Erich. **The form and extent of the region of indistinct vision in quick forward motion.** Acta Ophth. Orientalia, 1939, v. 1, July, p. 191. (See Section 3, Physiologic optics, refraction, and color vision.)

Yanes, T. R. **Travel impressions.** Rev. Cubana de Oto-Neuro-Oft., 1938, v. 7, Nov.-Dec., p. 140.

The author gives an account of the meeting of the American Academy of Ophthalmology and Otolaryngology which was held at Washington in October, 1938. Complications of cataract surgery, contact lenses, gonioscopy, surgical management of irradiation cataract, homatropine-benzedrine cycloplegia, the use of snake venom, and conditions governing iris prolapse are among the subjects reviewed.

Edward P. Burch.

19

ANATOMY, EMBRYOLOGY, AND COMPARATIVE OPHTHALMOLOGY

Walls, G. L. **Origin of the vertebrate eye.** Arch. of Ophth., 1939, v. 22, Sept., pp. 452-486.

The author points out that cytologic and cytogenetic knowledge of the visual cells in the last analysis demonstrates the value or lack of value of any theory of the origin of the eye. He then reviews Müller's theory of the anterior pigment spot of the amphioxus, Lankester's theory of the eye of the ascidian larva, Balfour's theory of the integumental photoreceptors, Kupfer's theory of the epibranchial placodes, Boveri's theory of the photoreceptors of the amphioxus, and Studnička's theory of the photosensory ependyma. From the cytology and cytogeny of the visual cell, he summarizes the indications of the origin of the retina and the origin of the lens, pointing out that the vertebrate retina did not evolve from anything earlier or simpler than the wall of the neurotube itself, and that likely when the optic cup had differentiated, and the use for lens developed, a lentoid thickening of the surface ectoderm appeared —probably called into existence by chemical emanations from the optic cup. (4-page bibliography.)

J. Hewitt Judd.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth

640 South Kingshighway, Saint Louis

News items should reach the Editor by the twelfth of the month

Deaths

Dr. John Burgess Lynch, New York, died December 2, 1939, aged 78 years.

Dr. Dolph D. McHenry, Oklahoma City, Oklahoma, died December 28, 1939, aged 66 years.

Dr. William C. Tuckerman, Cleveland, died December 5, 1939, aged 61 years.

Dr. Robert B. Blue, Chicago, died December 8, 1939, aged 63 years.

Societies

The Washington, D.C., Ophthalmological Society on February 12, 1940, was addressed by Dr. Raymond L. Pfiefer of New York, on "Lesions of the chiasm." The program on March 25, 1940, will include the following titles: "Carcinoma of eyelids," by Dr. Cecil S. O'Brien of the University of Iowa; "Origin of choroidal tumors," by Dr. Georgiana D. Theobald of Chicago; "Some salient features in the surgical treatment of extraocular muscles," by Dr. Avery D. Prangen of Rochester, Minnesota.

The Corpus Christi Eye, Ear, Nose, and Throat Society, at its meeting on November 10, 1939, elected Dr. F. K. Stroud, chairman, and Dr. Arthur Padilla, secretary-treasurer. The meetings take place on the second Friday of each month.

The following list of officers in the Los Angeles Society of Ophthalmology and Otolaryngology were appointed for 1940: President, Dr. John P. Lordan; vice-president, Dr. R. R. Montgomery; secretary-treasurer, Dr. Colby Hall; committeeman, Dr. Pierre Viole. Place, Los Angeles County Medical Association, 1925 Wilshire Boulevard, Los Angeles; time, 6:00 P.M., fourth Monday of each month from September to May, inclusive.

The annual congress of the Ophthalmic Society of Egypt will take place at the Memorial Ophthalmic Laboratory, Giza, on March 29 and 30, 1940. The symposium for this congress will be on blepharitis.

Personals

Dr. Frank Burch has recently gone to China as head of the Department of Ophthalmology at the Union Medical College at Peiping for six months.

Dr. Joseph C. Beck has accepted a half-time position at the Illinois Eye and Ear Infirmary, as associate dean of education for the house officers.

Dr. Walter R. Parker delivered the second deSchweinitz Lecture, on "Uveitis with associated alopecia, poliosis, vitiligo, and deafness," before the Section on Ophthalmology of the College of Physicians of Philadelphia, on Thursday evening, November 16th. There was a dinner for Dr. Parker before the meeting.

Dr. Charles H. May announced in 1938 that a Portuguese translation of his "Manual of diseases of the eye" was about to be published by Patricio Cama and Companhia, Rio de Janeiro. He is now informed that the book is being translated into Urdu by the Osmania University, Hyderabad, India. This is the tenth translation of the book into a foreign language and, in connection with the sixteenth American edition, is an unusual record.

Dr. James H. Bryan announces his association with Dr. M. Hayward Post in the practice of ophthalmology, 520 Metropolitan Building, 508 North Grand Blvd., Saint Louis, Missouri.

Dr. Louis B. Bushman, who has been director of the Department of Ophthalmology at the Creighton University School of Medicine since 1919, has been made professor emeritus. Dr. Charles M. Swab has been appointed director of the department. Dr. Swab was graduated from Creighton University in 1916 and received an M.S. degree in medicine from the University of Pennsylvania in 1934. He has been associated with the Department of Ophthalmology in the School of Medicine and the Creighton Memorial St. Joseph's Hospital in the capacity of associate professor since 1932.

A note, dated Rome, January, 1940, from the secretary of Dr. Casey Wood, has been received, containing the following information:

"Before he left Rome for America Dr. Casey Wood (almost in normal health after a serious six-months' illness) asked me to send you the following announcement.

"As his family are not sending out this year any Christmas or New Year's cards they trust you will accept this poor substitute for them, hoping it will reach you while 1940 is still young enough to carry the season's warmest greetings.

"Dr. and Mrs. Casey Wood and their niece, Miss Marjorie Fyfe, have decided to sail for New York on January 24. This decision is chiefly due to the early demolition of the Hôtel de Russia, in which they resided for over six years, to the difficulty of securing satisfactory accommodations in crowded Roman hotels, and

to the fact that they had not been home for four years.

"Their present intention is to stop over for a few days in New York and Chicago on their way to the Hotel del Coronado in southern California, where Mrs. Casey Wood lived most of the time while the doctor (eventually Colonel, Medical Reserve Corps, U. S. Army) was in service at Camp Sherman and in the Surgeon General's Office, Washington, during the Great War.

"They now propose to settle in Coronado until after the next presidential election. Meantime their (forwarding) mail address is c/o the Harris Trust and Savings Bank, Chicago."

Following is a copy of a letter to Dr. Crisp from Prof. Lindner of Vienna that should be of interest to his many friends.

Wien, 29. 11. 39.

Dear Dr. Crisp:

In sending you our list of reprints of this year I want to add a personal letter. In your Journal of Ophthalmology, you suppose as cause of the Munich keratitis, nutritional insufficiency. Dr. Gifford wrote to me in a similar way. Once more an example of total misinformation by your press. You may be absolutely certain that nobody is starving here and that nobody is hungry. We have not the variety of food we were used to, but nobody from my family has lost on weight. Secondly we do not get a trifle more food than anybody else gets, what I consider still more important. Hard working people have extra rates, children have more butter and milk, sick people get extra food. How does this look all in practice: We have far more bread than we can use up. Flour just the same. Potatoes are illimited, we have 600 kg. in our cellar. Grease and meat is little, but for myself I never took much meat. Fruit we have about so much as potatoes, from our own fruit garden. I enclose the last photograph of my family, taken the 17th of November. Our perfectly working organization in rationing practically everything I consider as the most frightful weapon against England and France.

. . . . . .

The exact knowledge about conditions here would shorten the war. There will be no revolution here. It is not so as in the last war, that the wealthy people could get everything and the poor ones nearly nothing. Everybody realizes this. On the other hand we have undergone the treaty of Versailles and this remembrance is the best cement for us all. Differences of opinion disappear now.

. . . . . .

I am sorry that our international congress will not take place. I remember with great pleasure the peaceful congress in Cairo and the undisturbed community we had with all the colleagues from all over the world. I enjoyed this especially because I have so many good friends all over the world. But for a long period there will be no meeting and no voyage in foreign countries. Anyhow I hope to see you again some day and I am certain we would find an understanding between us about all the questions present.

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(Signed) K. Lindner.